THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LVIII. No. 1472.] LONDON, JULY 28, 1891. [43RD YEAR. Price 6d.

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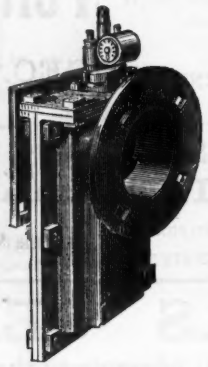

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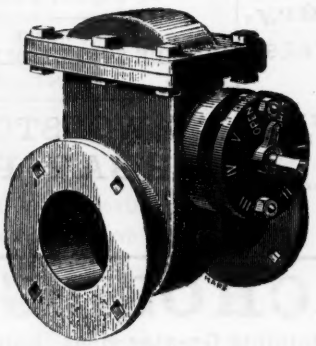

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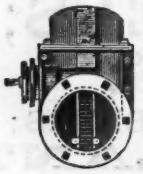

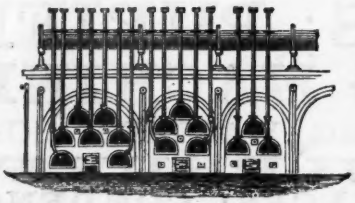

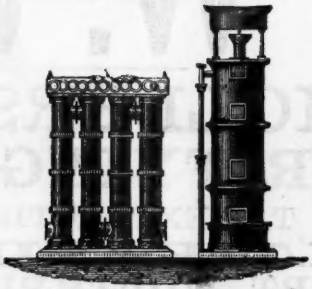

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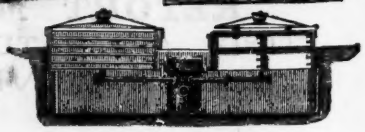

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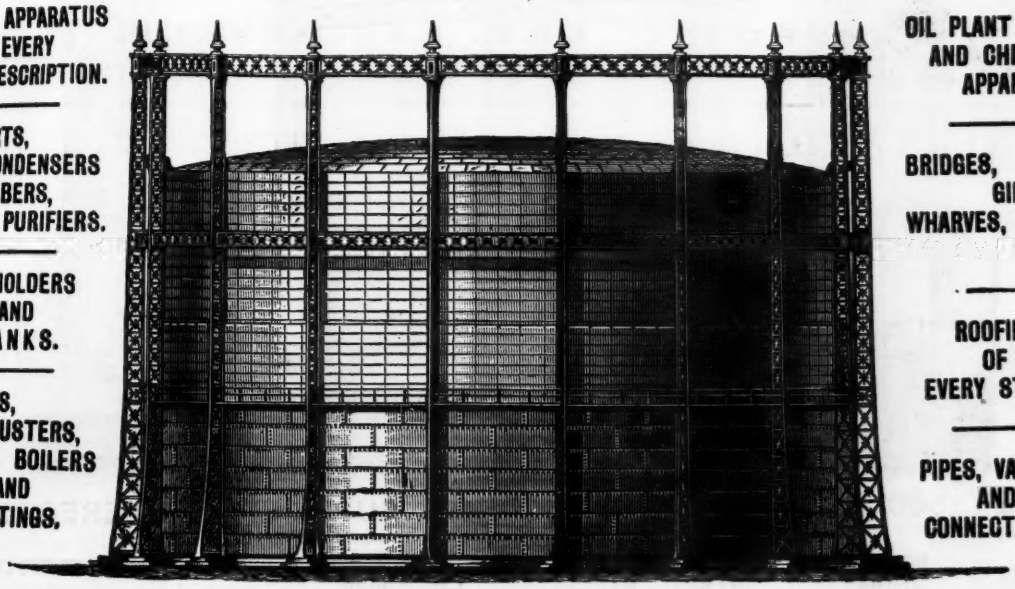

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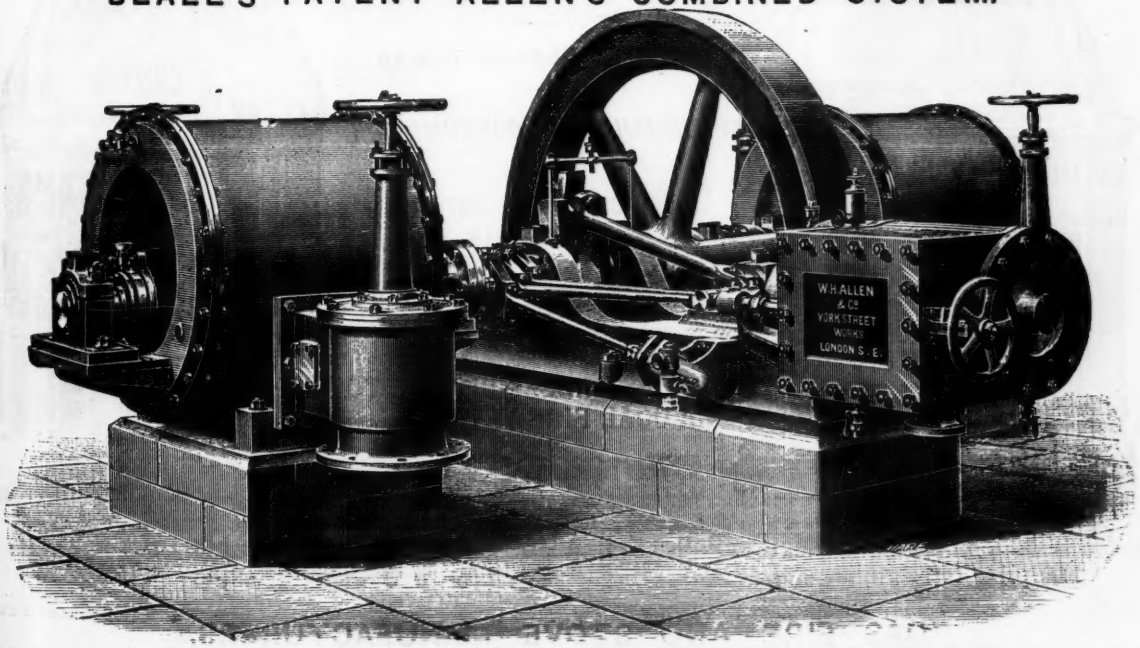

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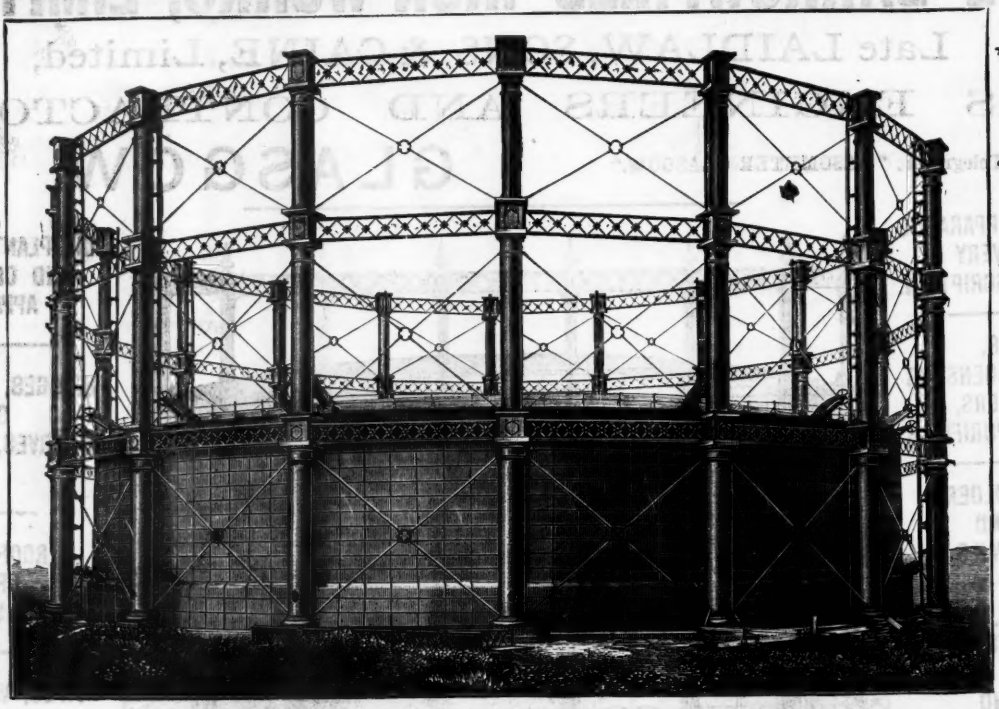

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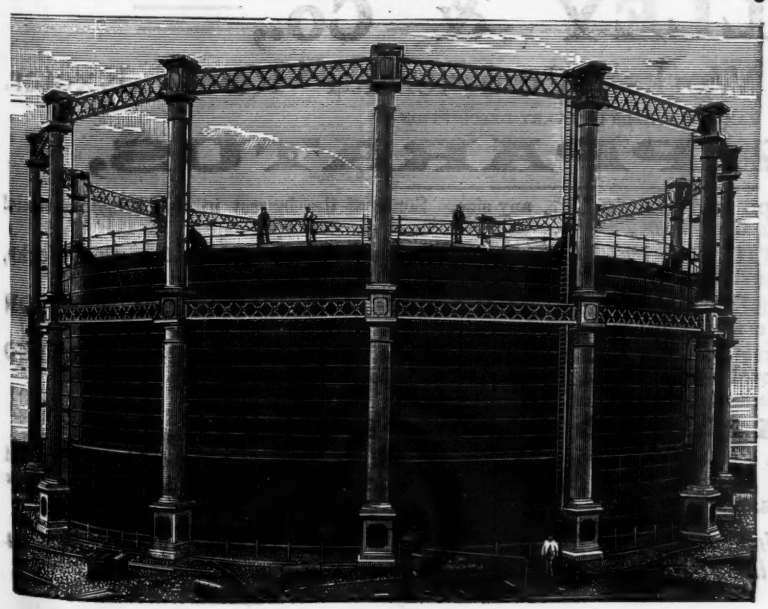

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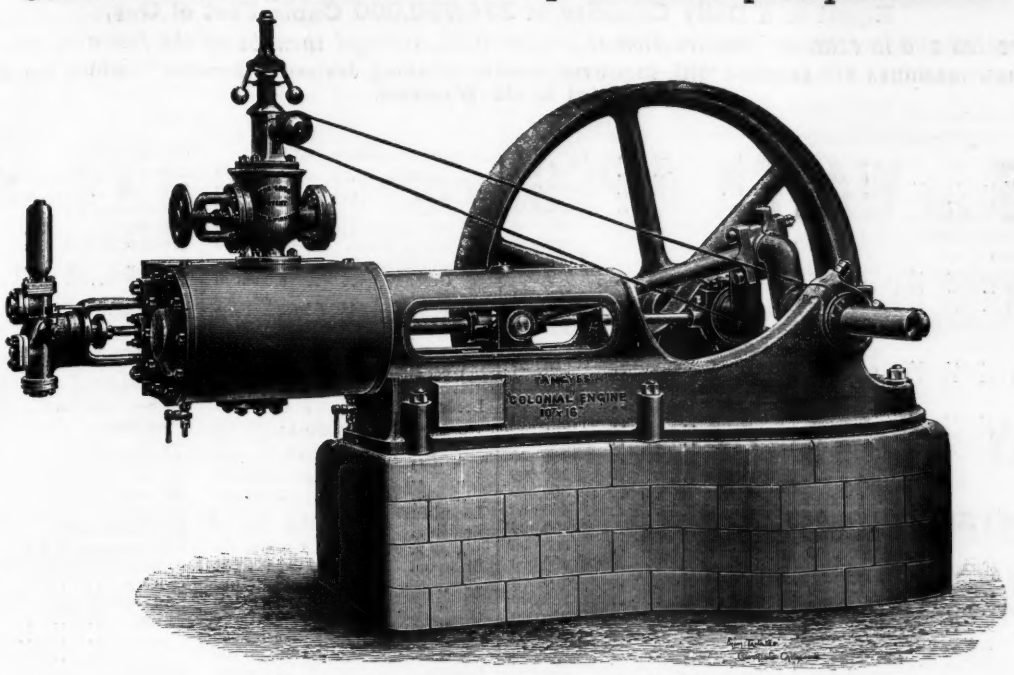
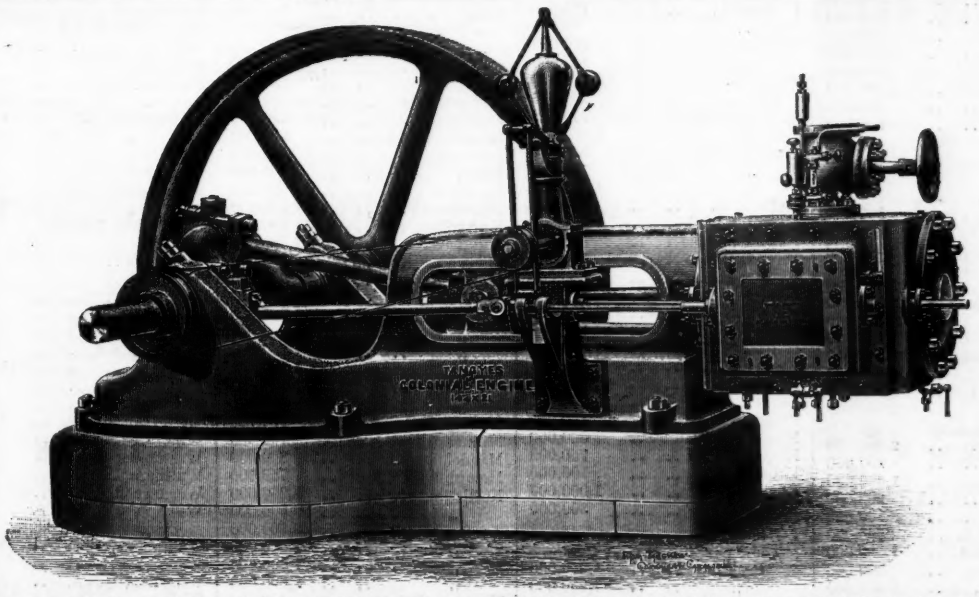
Constructed for Steam Pressures up to 100 lbs. per square inch.



From a Photograph of the 10 in. by 16 in. size, with Feed Pump.

Steam Cylinder, diam. .. .. ins.	4½	5½	6½	7½	8	9	10	12	14½
Stroke, length .. .. .. "	7	8	9	9	12	14	16	18	21
Revolutions .. .. per min.	250	225	200	200	150	140	125	116	100



Tangyes "Colonial" Steam-Engine, with the TANGYE-JOHNSON PATENT AUTOMATIC CUT-OFF GEAR. From a Photograph of the 14½ in. by 21 in. size.

Steam Cylinder, diam. .. .. ins.	8	9	10	12	14½
Stroke, length .. .. .. "	12	14	16	18	21
Revolutions .. .. .. per min.	150	140	125	116	100

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Adelaide	600,000
Aldershot	200,000
Allegheny, U.S.A.	1,000,000
Ashton-under-Lyne	1,250,000
Amsterdam	1,500,000
"	1,500,000
Annaberg	200,000
Arcachon	100,000
Animal Charcoal Co.	200,000
Altoona, U.S.A.	350,000
Buxton	250,000
Bradford	1,000,000
"	1,250,000
"	1,250,000
"	1,250,000
"	1,000,000
"	1,000,000
"	3,000,000
Bremen	150,000
Baltimore, U.S.A.	1,000,000
"	1,000,000
"	1,000,000
Balmain, N.S.W.	125,000
Bishops Stortford	150,000
Blackpool	400,000
Brussels	1,250,000
"	1,250,000
"	750,000
"	1,250,000
Banbury	250,000
Birmingham	5,000,000
Birkenhead	2,500,000
Blackburn	1,500,000
Bochum	600,000
Burntisland	250,000
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Clevedon	200,000
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Cincinnati, U.S.A.	1,500,000
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"	1,000,000
"	1,000,000
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Crewe	1,250,000
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Cadiz	300,000
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Driffield	100,000
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Dover	750,000
"	1,000,000
Deal	200,000
Derby	1,500,000
Dublin	3,000,000
Dowlais	100,000
Douai	500,000
Denton	500,000
Derby, U.S.A.	350,000
Denver, "	500,000
" "	1,000,000
Düsselldorf	750,000
"	500,000
Dumfries	250,000
Dunedin, N.Z.	400,000
Darlington	1,250,000
Detroit, U.S.A.	750,000
Edinburgh	1,500,000
"	2,000,000
Enfield	300,000
Essen	300,000
Elbing	150,000
Falmouth	150,000
Frankfort	300,000
Farnworth	400,000
Fenton	400,000
Friedenshütte	500,000
Fürth	400,000
Freiburg	200,000
Goole	250,000
Glossop	300,000
Guildford	300,000
Gloucester	1,250,000
Gera	300,000
Grafton, N.S.W.	100,000
Grieg	300,000
Georgetown, U.S.A.	250,000
Gluckauf	200,000
Heywood	600,000
Holywood	125,000
Huy	70,000
Harrow	250,000
Harrogate	250,000
Halstead	150,000
Heilbronn	200,000
Havanna, Cuba	750,000
Hastings	1,500,000
Huddersfield	300,000
"	750,000
"	1,500,000
Hof	200,000
Hampton Wick	500,000
Heckmondwike	500,000
Haverfordwest	100,000
Halifax, N.S.	350,000
Hamm	200,000
Halle	400,000
Heidelberg	300,000
Hartford, U.S.A.	1,000,000
Ilkeston	300,000
Inverness	250,000
Ilkley	200,000
Ilford	100,000
Kingston-on-Hull	400,000
Kidderminster	750,000
Kidsgrove	100,000
Königsberg	1,000,000
King's Lynn	300,000
LONDON:—	
The Gaslight and Coke Co.:—	
Beckton	1,250,000
"	1,250,000
"	1,250,000
"	1,250,000
"	1,250,000
"	1,250,000
"	2,500,000
"	2,500,000
Silvertown	1,000,000
Bromley	2,000,000
"	1,500,000
"	1,500,000
"	1,500,000
"	2,000,000
"	1,500,000
Shoreditch	2,500,000
LONDON—*Continued.*	
Pancras	1,500,000
"	1,500,000
Pimlico	2,000,000
Nine Elms (2)	3,000,000
Kensal Green (2)	3,000,000
South Metropolitan Co.:—	
Greenwich	3,000,000
Woolwich	400,000
Vauxhall	3,000,000
"	3,000,000
Lea Bridge	300,000
West Ham	1,500,000
"	3,000,000
Leeds	2,000,000
"	3,000,000
"	3,000,000
"	3,000,000
"	3,000,000
"	2,000,000
Leominster	150,000
Leiden	560,000
"	600,000
Liverpool	2,000,000
"	2,000,000
"	2,000,000
"	2,000,000
"	2,000,000
" (3)	3,000,000
Lincoln	1,000,000
"	600,000
Lowell, U.S.A.	1,000,000
Laclede, "	1,000,000
Louisville "	1,500,000
Long Eaton	500,000
Lille	900,000
"	450,000
"	750,000
"	250,000
"	250,000
Luckenwalde	330,000
Liegwitz	300,000
Lincoln, U.S.A.	250,000
Lawrence, "	500,000
Lynn, "	300,000
Lyons	1,500,000
Maidstone	1,000,000
Marseilles	1,500,000
"	1,500,000
Mons	500,000
Malines	250,000
Melbourne	1,500,000
"	1,500,000
"	1,500,000
"	1,500,000
"	1,500,000
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Manley, N.S.W.	100,000
Minneapolis, U.S.A.	750,000
Magdeburg	300,000
Memphis, U.S.A.	750,000
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"	2,500,000
"	2,500,000
"	2,000,000
"	1,500,000
"	2,000,000
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Namur	250,000
Newark	350,000
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Oswestry	250,000
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" "	750,000
Plauen	300,000
"	300,000
Portsmouth	2,500,000
"	2,500,000
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Portland, "	560,000
Pawtucket "	500,000
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Rouen	250,000
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Reigate	200,000
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Roxbury, "	500,000
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Richmond	1,500,000
Reading	2,000,000
Reichenbach	200,000
Salford	1,750,000
"	1,750,000
"	1,750,000
Smethwick	750,000
Sydney, N.S.W.	1,000,000
"	1,000,000
"	2,500,000
"	50,000
"	50,000
Sunderland	1,500,000
St. Joseph's, U.S.A.	250,000
Spa	100,000
Sevenoaks	300,000
St. Petersburg	2,000,000
"	1,500,000
St. Louis, U.S.A.	2,000,000
"	2,000,000
"	1,000,000
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"	2,000,000
Sheepbridge Coal Co.	40,000
Stettin	200,000
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Tottenham	1,000,000
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Toronto	1,000,000
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" "	600,000
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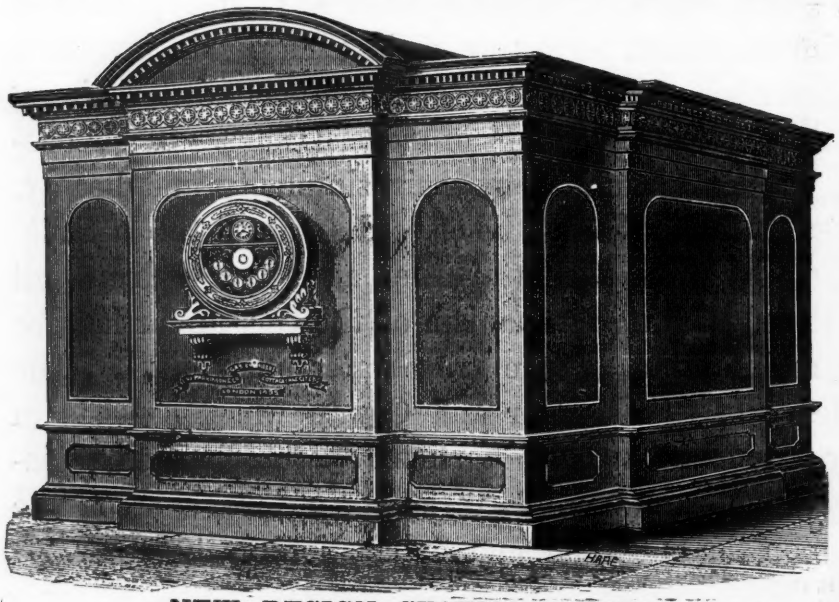

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[See also Advt., p. 188.

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THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, JULY 28, 1891.

An American on Paris Gas.

AGAIN we have to notice a prominent magazine article bearing upon gas supply; but whereas last week the writing we had to criticize was the work of an Englishman, and related to the gas supply of London, this time it is the lucubration of an American upon the gas supply of Paris. It is well understood that Paris furnishes Americans with a good deal of what no so-called metropolis of their own contains. Whatever else can be said against Paris, it is certainly not commonplace—or at least its commonplace is different from that which overwhelms the American citizen at home, and drives him to look abroad for ideas and impressions after the monotony of his surroundings has palled upon him. Paris is the artistic capital of the United States; and we have also had previous occasion for remarking that where American political or administrative ideas depart from the English spirit, they follow the French. The rigidity of administrative methods under an appearance of great liberty of principle is seen in both France and the United States; and in both countries a popular sentiment of admiration of the established order of things, because they are capable of being described as National, accompanies great patience in enduring abuses Generalities are always open to exception. But perhaps we shall not do violent injury to either the British or the French-American national spirit by remarking that whereas the Briton wants his administrative arrangements to be perfect, and is always tinkering at them to this end, the French-American believes everything of his is either perfect already, or cannot be amended by the wit of man.

There is, of course, a vast amount to be admired in French ideals and practices, as well in administration as in other cares of a civilized community. We are quite prepared to admit with the most perfervid American who—not content with the old joke which assures him that "all good Americans go to Paris when they die"—forms his style in this life after a French model, that the world's culture would be different, and worse than it is, but for the French polish upon it. But there are limits to the admiration that any rational being—not a Frenchman, or a Yankee having a literary turn—can feel for things French; and in the name of the gas industry we draw the line at the system under which Paris is supplied with gas. Yet this lack of appreciation of a French peculiarity has the remarkable effect of placing us in direct antagonism with one Mr. Albert Shaw, who has an article on "Paris—"the Typical Modern City," in the current number of the *Century*. Why, in the name of everything that is reasonable, an American magazine should need to go to Paris for an illustration of modernity, when Chicago is so much handier for the purpose, passes ordinary comprehension. If the cities of the United States are not modern, what are they? They may not be very satisfactory examples of the operation of the great Republican type of civilization; but why reject them in favour of a city which was at least as much the city of Villon and Rabelais as it is that of President Carnot? With this preliminary inquiry, we will proceed to deal with Mr. Shaw in order.

According to this enthusiastic witness, "Paris has been "the unrivalled leader" in everything that advantageously distinguishes modern urban arrangements from mediæval chaos. We are not concerned to trace in detail Mr. Shaw's startling developments of this theme. Those who "feel "like it," as he might have said in the days of his guileless Yankeehood, before he learnt that there was still some good remaining in a corner of effete Europe, may read the story for themselves in the magazine. Our attention must be confined to the columns of type in which Mr. Shaw maintains that Paris is "the best-lighted city in the world." The author remarks incidentally that he "might easily "write a small book upon the history of the Paris Gas "Supply." We sincerely wish he would do so. The Paris Gas Company and the Municipality might, between them, make it worth his trouble, inasmuch as he is already inspired with the notion that the Paris gas concession "is "a more enlightened and satisfactory arrangement than "any that has been made by large American cities." This is not saying much, it is true. We can even conceive of a person who has been brought up in these dark ages of American gas administration—with its inglorious confusion of Massachusetts Commission, Brooklyn ordinance, Addicks piracy, St. Louis "deals," and the rest of it—being struck with admiration of the cast-iron severity of the concession system. As a description of a conspicuous feature of the administration of Paris under the Municipality, we should have no fault to find with Mr. Shaw's story of the Parisian Gas Supply; but when this is held up to the admiration of a benighted English-speaking world, we enter an emphatic protest. We decline to subscribe to Mr. Shaw's amateur belief that a settlement which has saddled Paris with gas as poor in quality as is to be found in Europe, at an unalterable price as high as that charged for gas of double the illuminating value in New York, and twice as

high as the London rate, is an admirable arrangement, notwithstanding the fact that the plunder of the gas consumers is partially shared by the Municipality. Mr. Shaw's competence as a witness of truth is exhibited by his observation that the present system of gas supply for Paris "is so "good that there is comparatively little reason to desire "a radical change." Name of M. le Préfet de la Seine, is this your idea of the prevailing sentiment on the subject, in and out of the Municipal Chamber? Needless to say, the recurrent futile Commissions, in which Parisian discontent with the concession has come to a head, are apparently unknown to Mr. Shaw.

This sort of reading, apparently intended for the instruction of the great American public, is very melancholy stuff for the purpose. An American magazine is reputed to be a highly influential kind of publication. At least, such a magazine as the *Century*, which is far too serious to be entertaining, ought to be instructive by way of compensation. Such writings as this of Mr. Shaw, however, are a delusion and a snare. It is doubtless a sign of progress when an American writer can dare to assert that his "fellow-countrymen insist upon remaining in a "state of invincible ignorance rather than learn anything "from the technical and scientific achievements of "Europe." But the question arises whether they are not better so than if they were prone to follow the first *ex parte* advice offered them by irresponsible counsellors like Mr. Shaw himself. What is the good of rhapsodizing about everything Parisian, when one has a commission to describe Paris? It only leads the next man, who has to describe Berlin, to do the same; and the bewildered home reader is left as much in the dark as ever, and as much exposed to the respectable pickpockets who know all about Paris and Berlin, as well as about London and New York, and are quite as willing to suck the blood of the gas consumer in one place as in another. If we might presume to address a hint to so great a personage as the Editor of an American magazine, who is regarded as a much more magnificent individual than a Cabinet Minister, it would be to the effect that reliable information upon gas supply, railway accommodation, electric lighting, and so forth, is not to be secured by paying a rhapsodist to tell how these things are managed in the particular locality which it is his cue to exalt, but by following out the developments of the things themselves, as these are modified by the genius of different peoples and by other considerations. In this way it might be possible to discover the *summum bonum*, which is certainly not to be stumbled upon in the form of an airy statement of a half-instructed witness, who, if he knows the truth, is under no obligation to tell it to the detriment of the symmetry of his general case.

Labour Topics.

THE New Unionists, with Mr. Ben Tillett at their head, have not made quite so much out of the Labour Commission as they probably expected to do. It should be more widely known than it is that, up to the present, the Commission has not called any witnesses; all the evidence hitherto taken having been volunteered. This accounts for the rush of agitators, who have been allowed so much "rope" before the Committees, that they have "hanged themselves," as the aphorism has it, one after another. It turned out that when these self-appointed regenerators of society, whose loquacity is so highly appreciated by Sunday mass meetings, were placed before a group of urbane gentlemen who not only permitted them to talk at large, but even gently drew them out by leading queries, they very soon exhausted themselves, without, even in their own estimation, materially advancing what they are pleased to call their cause. Neither Mr. Tillett, Mr. Quelch, nor any of the stock company of workmen's grievance-mongers can complain of being denied an opportunity of stating their views before the Commission; but the result has been absolutely *nil* in respect of suggestiveness of remedy for the hardships so loudly, but also so vaguely, complained of by these Social Democrats. Mr. Tillett's collapse was perhaps the most complete of any. He is not the first free-tongued person who has discovered that declamation is not evidence, nor discontent argument. The discomfiture of these self-taught Social Economists is doubtless a matter of wonder to themselves. When raving at mass meetings, and cheered to their hearts' content by an excited mob, they have probably felt themselves strong enough to carry all before them. We have all heard the mob-orator shouting his questions to an imaginary opponent, and taking the absence of response for admitted defeat. He knows all about it; *he* is not afraid of any man, and what *he* says is, &c., &c. It is all very grand, and unfortunately not harmless; but when what purports to be the essence of all this outpouring of the spirit of an (imaginary) enslaved labouring class is told in the hearing of an investigating Committee, it amounts to astonishingly little. The New Unionists fared badly enough when their crude nostrums of State employment, compulsory limitation of working hours, State arbitration, &c., were scouted by the intelligent Northern operatives who have not yet been contaminated by the misty German Socialism which hangs about certain Metropolitan purlieus. But their case crumbled under the first impact of facts, which were supplied by Mr. G. A. Laws, of the Shipping Federation. Mr. Laws's evidence has been the only statement yet offered which bears directly upon the new Unions; and so damaging was it, that rumour credits the representatives of the other Unions of the same category who have not yet appeared before the Commission, with the intention of keeping away from the witnesses' chair. If they act thus, of course, their notoriety will not keep for very long.

The congenital weakness of all the tribe of Unionist agitators—inability to tell the truth—is gradually finding them out before the Commission. How hopeless it is to expect an individual of this order to recognize the fact that lies sooner or later cut the throats that utter them, appears even in the leading article of the last number of Mr. Tom Mann's paper, the *Trade Unionist*. This composition pretends to deal, in the manner of the honest, straightforward working man, with the subject of "Employers' Unions" and their organizers—of course, with special reference to the Shipping Federation and Mr. Laws. The writers calmly inquire where is the difference between Mr. Laws and the Secretary of the Seamen's and Firemen's Union. We are asked: "What is there to distinguish the man A, "who says, 'On behalf of my organization I shall have "'only such-and-such men to man the merchant service,' "from the man B, who says, 'On behalf of *my* organiza-"'tion I shall have only *such-and-such* men to man the "'merchant service?'" Just a week before this deliberate representation of the asserted identity between Union and Federation principles, Mr. Laws had told the Commission, before Mr. Mann's face, that "the object of the Federation "was to maintain liberty of contract, and to resist the "New Union methods of coercion," directed to secure the object that "none but Union men should find employment "in British vessels;" and that, so far from objecting to Union men working with the Federation ticket, of the 40,000 men registered by the Federation, "one-half are "Union men and one-third are members of the Seamen's "and Firemen's Union." Not a word of exception was taken to this evidence; yet the *Trade Unionist* forthwith misrepresents the facts under the cloak of the "Liberty of "the Press." This sort of thing never yet answered in the long run; and it is hardly likely to help those who perpetrate it now.

The North British Meeting.

THE members of the North British Association of Gas Managers met in Edinburgh on Thursday and Friday last, under the presidency of Bailie Robertson, of Bathgate. The attendance was fairly good; and the technical business, as usual, almost too much for the time allotted for its discharge. The first portion of our report of the proceedings will be found in another part of the present issue; and the remainder will appear next week. The President's address was a very natural production of an intelligent gas manager situated, as Bailie Robertson is, in a small place where little but routine work falls to the administrators of the gas undertaking, and the responsible head of the concern must look abroad for matters of controversial interest. We gladly recognize the soundness of the President's advice to his youthful compatriots, to pay more attention than they do to the City and Guilds of London Institute Examinations in Gas Manufacture. These admirable tests of knowledge are not appreciated as they ought to be in any part of the country; but Scotland certainly does not shine prominently in the pass lists. The remainder of the address does not call for any particular comment. Some useful papers were read at the

meeting; one of the most noteworthy of them being the communication in which Mr. George R. Hislop, of Paisley, followed up his previously-described researches into the principles of construction of the burners intended to be used for consuming cannel gas. Mr. John West's paper on stoking and coal-handling machinery was another of those lengthy contributions to technical literature with which the author's development of his now well-known system of mechanical stoking is regularly accompanied, and which he intends should serve to record progress in this matter. Some more of Mr. Hislop's work was brought before the meeting by Mr. George Love, of Paisley, who described his chief's recuperative retort-furnaces; and a very good paper on the employment of regenerative gas-lamps for lighting interiors was read by Mr. D. Macfie, of Edinburgh. The subject of detecting gas leakage was also treated by Mr. David Robertson, of Dunoon. The Association has tried an experiment with the "question-"box," which figures prominently at some American gas managers' meetings; but the result is not encouraging, so far. The excursion, which is always a great feature of these North British meetings, was very enjoyable on this occasion; the weather being favourable. The President for the ensuing year is Mr. A. MacPherson, of Kirkcaldy; and the place of meeting is to be Dundee. The President of The Gas Institute, Mr. W. A. Valon, of Ramsgate, and the ex-President, Mr. J. Hepworth, of Carlisle, attended the meeting, and were elected ordinary members of the Association.

A Forgotten Caution.

It is not by any means an easy matter for the followers of one trade to instruct the practitioners of another industry as to how these can best conduct their own affairs. This observation is not by any means a novel one. The caution, *ne sutor ultra crepidam*, is asserted to have been addressed by the painter Apelles to a cobbler who, because he was able to point out a blunder in the drawing of a shoe in one of this artist's pictures, thought himself qualified to criticize the whole work. The story is probably apocryphal, like most of the apposite tales which pretend to account for the origin of traditional expressions; but the spirit of the proverbial caution is constantly being aroused by the most modern instances. How natural it is for a disinterested adviser to commence an adjuration to another person with the observation: "If I were you, "I should do so-and-so." The counsellor generally feels hurt if he is, in return, curtly told to "mind his own busi-"ness;" but there is, in truth, no working rule of which we all so badly need reminding as this. This reflection occurs upon reading an innocent piece of advice lately offered to Gas Companies by our contemporary the *Electrical Review*. The counsel was expressed in a brief editorial paragraph, headed, "The Gas Companies must "Look to their Bye-Products," which repeated some remarks attributed to a Glasgow gentleman who recently presided at a chemical lecture. This well-informed individual opined that there is a question whether the time has not come for coal to be distilled for its so-called residual products alone; and our contemporary commented upon this sapient observation in the way to which we now draw attention. The cream of the joke is that this same technical journal quotes approvingly, in another issue, the statement that "probably there is no human being more "ignorant of the commonest facts of scientific experience "than your hack newspaper writer." Are we to say that the statement is equally true of the mental condition of the average electrician with regard to the facts of gas supply? At any rate, what would our contemporary think of our intelligence, if we were to print in these columns warnings to electric light companies to look to the insulation of their cables, to make sure that the transformers they use are as efficient as possible, or to take care that their secondary batteries do not break down too soon? To us it appears so supremely ridiculous in an outsider to put himself to the trouble to warn Gas Companies to look to their bye-products, that words fail to describe the impressions created in this case. There is a proverb which implies that it is superfluous to instruct one's grandmother in the right method of sucking eggs. But this Journal is not a periodical intended solely for the revival of proverbial wisdom for the instruction of a School-Board-ridden age; and so we shall not devote more space to the subject.

WATER AND SANITARY AFFAIRS.

Sir John Lubbock has his answer, and is told by the Chancellor of the Exchequer that, as the London County Council (Water Supply, &c.) Bill is "highly contentious," it would be contrary to the pledges given by the Government to afford facilities for the passing of such a measure. In the next place, Sir J. Lubbock tells the County Council that "he could not be surprised" at the answer he had received; and he feared he had no option but to "drop "the Bill." The Council had "done all they could;" and no responsibility as regarded the supply of water to London rested upon them. But the Council have spent some of the ratepayers' money over the affair; and already £3000 are gone out of the £5000 allowed for the purpose. One member of the Council pressed the question at the meeting of that body last Friday, whether the Water Committee had acted on the reference made to them, so as to inquire into the practicability of providing an independent and competing supply. "That was the point of "the reference," said the interrogator. The Vice-Chairman (Sir T. Farrer) is reported to have replied that "the "question of competition was a subsequent one, after they "had ascertained what water could be got." It may be as well to remind the Council that neither Sir Matthew Ridley nor their own Engineer considered a competitive supply in any sense practicable. Neither does the report of the Select Committee suggest recourse to such a method. As the County Council entertain great respect and admiration for the report of the Select Committee, as embodying their ideas, they must give weight to the fact that this particular idea is left out of the report. Concerning what has been done by the Water Committee of the County Council, the Vice-Chairman explains that the £3000 have been spent with a view to discover whether the present sources of supply are adequate in quantity and quality, and, if they are not, what other sources are available. A suggestion has been made that a clause might be inserted in the General Powers Bill of the Council, giving the Council further power in regard to their inquiry. This matter is receiving the "consideration" of the Committee. All we can see is that the spirit of "inquiry" is abroad, and very much so. The Water Companies are left "severely alone;" while the County Council try to elaborate some magnificent scheme—which they may be well assured the ratepayers will never tolerate. The principle on which the property of the Water Companies ought to be purchased has been illustrated in the case of another kind of undertaking; Mr. Fardell denouncing the idea espoused by Lord Monkswell, that the tramways should be taken over at "a price far "below their value in the market." Mr. Fardell, replying to his Lordship in the columns of *The Times*, condemns such a bargain as "unjust to the shareholders." If so with the tramways, why not with the Water Companies? As we have said before, if this question is to be quickly solved, the Water Companies should be approached with a view to an honourable settlement. If this be not done, nothing remains but a perpetual beating about the bush; or, in other words, interminable "inquiries" and fruitless "con-"sideration," interspersed, it may be, with showy schemes that will never be seriously entertained.

There seems to be a considerable amount of mystery about the River Lea, if we may judge by the extraordinary statements made from time to time concerning that stream, in its relation to the water supply of the Metropolis. During the progress of the Corporation inquiry under Sir W. Guyer Hunter, a witness deposed to some singular freaks on the part of the Lea, in taking up impurities from sources which were thought to be inaccessible to that river. According to other stories, it would seem as if the Lea had altogether gone out of existence. A long letter in *The Times* informs us that, "as a matter of fact, "now and for some years past the entire summer flow of "this river [the Lea] has been diverted and sucked "up by the two Water Companies; and below their in-"takes the stream ceases to flow." A few lines farther on we are apprised of the alarming circumstance that the River Lea "is now practically pumped dry." What with the New River and East London Companies, and the Lime-house Cut, not only the River Lea but the catchment basin of the whole valley is drained of its resources; and a catastrophe would be inevitable were it not for the head waters of the chalk formation, with its subterranean channels.

Happily, there is water somewhere, furnishing an enormous population with a supply which, down to the present moment, has been found adequate. Giving the gentleman who writes to *The Times* credit for not quite meaning what he says, we gather from his letter that, in his opinion, all the water the Lea can furnish is now appropriated, and no increase in the supply from that quarter can be hoped for. But he takes small account of the deep wells; and we very greatly question whether he has duly sounded the "subterranean channels" of which he makes mention.

Proceeding with another part of this subject, we are presented with a further puzzle, rendering an additional explanation necessary. The writer of the communication to the leading journal, professes to describe the condition of the "intake stream" of the New River Company, whence are drawn the 23 million gallons of water per day derived by that Company from the Lea. The locality is between Hertford and Ware; and the letter-writer declares that a few days ago the water at that spot was "turbid" and slimy looking, and had evidently done duty before "for man or beast in its course from Luton downwards." It is acknowledged that, as a supplement to this objectionable liquid, four million gallons of good water are obtained from what the writer calls "the Shadwell spring." We may observe that the average daily supply given by the New River Company last year from all sources, exceeded 31 million gallons. But the correspondent in *The Times* states that, so far as he can understand the case, the New River Company have only a supply of some 4 million gallons of water daily "really fit to place before "the London people to drink." As for the East London Company, their case is said to be worse, as having nothing fit to drink to put before the people. "In fact, Sir," says the writer of the epistle, "the Lea is played out as a "source of water supply for London." From this marvellous lucubration we turn to the official report by Dr. Frankland. We there find it stated that, during the year 1890, the New River Company's water, in respect to its moderate amount of organic matter, "ranked with the "deep-well water on the average;" and that the Lea water, including the East London, delivered during the year, "contained markedly less organic matter than at "any time during the previous twenty-two years." The New River supply was very nearly equal in purity to that derived from the deep well at Tottenham, and was positively more free from organic matter than the water of the Colne Valley. Evidently, what the writer in *The Times* saw, and what the people of London drink, are different things. Neither is the Lea Valley as yet an arid waste.

North of Ireland Association of Gas Managers.—The annual meeting of this Association will take place on Tuesday, the 11th prox., in the Town Hall, Belfast, under the presidency of Mr. R. Ross, of Dungannon. We learn from the programme of arrangements issued by the Honorary Secretary (Mr. James Whimster, of Armagh) that, in addition to the President's address, three papers will be read. Mr. D. Williamson, of Ballybay, will ask his colleagues to give their views on the question of whether the supply of gas should be in the hands of companies or corporations; Mr. W. B. Featherstone, of Dundalk, will submit some sketches of retort furnaces, and deal with the subject of the utilization of waste heat; and Mr. T. Frizelle, of Holywood, will take up the question of the manufacture of sulphate of ammonia in small gas-works. Special interest attaches to this meeting from the fact that arrangements will be made for a visit to the Belfast Corporation Gas-Works, where the Claus purification plant is in use.

Resumption of Gas for the Public Lighting of Barnet.—At a special meeting of the Barnet Local Board held last Friday, under the presidency of Mr. C. Stevens, the contract entered into with the Barnet District Gas and Water Company to light the town for a term of three years was sealed. The Chairman formally stated the purpose for which the Board had met; and thereupon Mr. James moved that the seal of the Board be affixed to the contract. The Chairman was on the point of putting the motion, when attention was diverted by the entrance of three members, one of whom (Mr. Schmidt) asked a question; but he was interrupted by Mr. Huggins, who maintained that no discussion should be allowed, as they were simply there to seal the contract. The Chairman concurred; and expressed his intention of not receiving any amendment, as he believed it to be out of order. The Clerk, however, advised him that both would be in order. Mr. Cowles then moved that the Board go into Committee, so as to enable him to give them further information as to certain facts he had previously brought to their knowledge. The amendment was, however, lost by six votes to four; and, after a warm discussion, the original motion was carried.

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 177.)

It was to have been expected that the fresh impetus downhill which was furnished by the English River Plate Bank failure, would have considerably depressed prices in general. On the whole, however, they have been very fairly well maintained with the natural exception of Argentines and Uruguays. This is to a large extent the result of the recovery in the Money Market, where there is any amount awaiting a demand. While prices have held up, business nevertheless has been greatly restricted; for confidence has received another new shock just as it was beginning to make some faint show of returning. The consequence is that people are more nervously cautious than ever. Home affairs are pretty flourishing. The railway dividends are no worse than was expected; trade is not bad; and the weather is fair and favourable to harvest prospects. The Gas Market has been only moderately active on the whole; the big issues nearly monopolizing attention. Changes of quotation are few and slight. Gaslight "A," in response to the fillip it received at the close of the preceding week, opened 2 higher; but it could not hold on. By the following day there were symptoms of a relapse; so that on Wednesday it was back again at the old figures. These remained good for the rest of the week; but the closing bargain was at the lowest of the week—240½. By this time next week, the accounts will be out; and we shall know more about the position of affairs. South Metropolitan "A" and "B" have risen slightly; but there is nothing in the prices at which business was done to show that they are worth more than they were a week ago. A single bargain in the old, at middle price, was the only Commercial item. Suburbans and Provincials did not attract a market. Brentford is going to pay the old rates of dividend, and carry forward £36,000. Last January they carried forward about £44,000; so it looks as if the earnings of the last half year were insufficient to provide the dividends by some £8000. The Continental Companies had a full share of business, especially Imperial Continental. They are all steady and unchanged. South Americans were not at their best, as might be expected; and Monte Video and San Paulo fell ½ each. The only other feature was a relapse of ¼ in Oriental. Very little was done in Water; and the tone was dull—changes of quotation being all for the worse.

The daily operations were: The Gas Market opened with a flourish. Gaslight "A" advanced 2; South Metropolitan "A," 1; and ditto "B," 1½. Prices, however, were not extraordinarily good; and some Gaslight "H" went cheap. Monte Video fell ¼. Transactions were fewer on Tuesday, and showed a weaker tendency in Gaslight "A;" but nothing moved. On Wednesday, the quotation of Gaslight "A" receded 2; but actual prices were much the same. San Paulo was ½ worse. Transactions on Thursday were mostly at about middle figures, without inclination to move either way. Water was flat. Lambeth fell 3; and Southwark, 1½. The only feature on Friday was the activity and firmness of Imperial Continental. Oriental fell ¼. East London Water fell 1. Prices generally were no better than moderate on Saturday; but all quotations stood unchanged.

ELECTRIC LIGHTING MEMORANDA.

The Affairs of the Edison and Swan Company—The Edison Patent in America—The Electrical Transmission of Power—The Economical Use of Incandescent Lamps.

The Edison and Swan Company have held their annual general meeting, and declared a dividend of 17 per cent. These are the bare facts, of which more or less than a true deduction can be made, according to the standpoint of the critic. Electrical partisans are, of course, likely to point to this 17 per cent. as evidence that electric lighting is a paying thing. We are not disposed to make much or little of the fact. As the Chairman of the Company took pains to point out, 17 per cent. now is only a way of paying "back dividends"—for there have been several years during which Edison and Swan shareholders received nothing from their investment. Spread over the lifetime of the Company, the present and last years' dividends are tantamount to 5 per cent., which is certainly not much for a monopolist manufacturing company to make, whether their product be lamps or anything else. In the course of his speech at the meeting, the Chairman was very candid on the subject of the early history of the Company. He remarked that the predecessors of the present Board "had a theory that the rental of light was a very profitable thing. The theory was very good in itself; in practice it was found to be very bad—exceedingly ruinous in cost. . . We realized our loss, and we got rid of the thing on the best terms we could make; and you have now heard the last—the very last—of it." It may be all very well for the Edison and Swan Company to congratulate themselves upon being absolutely free of that lighting business upon which most of their customers for lamps have to depend for their living; but the idea affords cold comfort for the latter.

While dealing with Edison and Swan business in the United Kingdom, it is natural to refer to Edison prospects in the United

States. The great patent suit to which reference has repeatedly been made in this column, has been decided for the present in favour of Mr. Edison, who is adjudged the true inventor of the incandescent electric lamp. Mr. Edison gets everything under this judgment; and an account has been ordered to be taken of all lamp sales by other American makers. This is a most serious matter for the electric lighting interest of the United States, where it is stated that hundreds of thousands of lamps have been sold of other makes than Edison's, and at less than one-half the price charged by the Edison and Swan Company here for similar articles. The matter is not finally settled, however, as there is yet another appeal—to the Supreme Court of the United States—to which the case will, of course, be carried. Years may elapse before the leisurely course of Federal jurisprudence overtakes this particular cause; and meanwhile it will be safe to assume that tremendous preparations will be made on both sides for what is regarded on all hands as one of the greatest legal contests of the latter part of the century.

We hear a great deal about the prospects of power distribution by electricity as a possible competitor with the gas-engine; but it is notorious that the efforts of electricians to induce the commercial electro-motor to "materialize," as the Yankees say, are the reverse of successful even under the most favourable conditions. The case of Switzerland may be cited in point. Here are to be found the conditions of abundant water power and dear coal, with a demand for small power, to be used for watchmaking. Yet the distribution of electro-motive force derived from water power is as prohibitively costly in Switzerland as it seems to be everywhere else. An illustration is given in the case of the Commune of Locle, which is an important watchmaking centre, situated two miles from a river which gives a readily available force of 1750-horse power daily, and which has been supplied with light and power plant by a Geneva firm. The machinery comprises a 220-horse power turbine coupled direct to two 80-kilowatt Thury dynamos, one 30-horse power turbine coupled direct to two 10-kilowatt machines, a reserve 80-kilowatt turbine and dynamo, and a 100-horse power steam-engine for emergencies. The prices charged to the consumers vary according to the size of the motor and the method of payment; but it appears that a one-horse power motor costs £20 a year, or 9d. an hour by meter, which even the *Electrician* thinks prohibitive. Truly, the curse of costliness seems to damn the work of electricians everywhere and for all purposes.

Some months ago an American author undertook to set out for the guidance of electric lighting companies and their consumers a comprehensive statement of the most economical conditions of working incandescent electric lamps, showing how to get most light for money spent on lamps and current. This essay attracted some attention in England; but our electrical critics saw little in it that could assist English lighting companies and their customers, owing to the different factors of the problem of economical electric lighting on the two sides of the Atlantic. They admitted also that there is a lack of statistics relating to the use of incandescent electric lamps in the United Kingdom, from which such a computation might be prepared. We know what the power costs, whether home-made or purchased from a central-station company; and we also know how much we must pay for lamps. Further, we have learnt by experience that the nominal efficiency of an incandescent lamp falls very rapidly after it is put in circuit; so that a lamp which, when tested photometrically brand new from the factory, shows an illuminating power of 20 candles, drops after 100 hours or so to 16 candles, or even less, at which it will jog on, if well made, for another 500 or 600 hours. After this, it rapidly goes duller and duller, until if left in its place it will exhibit that lively appearance of a newly-blown-out wooden match which is so familiar in places where they are particularly solicitous to keep down the lamp-renewals account. The question is, when does it pay best to renew the lamps, knowing their price, efficiency, and the cost of current in every case? Electricians connected with the central stations are very shy of this subject. They profess to be ready to speak of anything connected with current; but the lamps are beyond their province. The lamp makers, on the other hand, will not be responsible for anything to do with current; but confine themselves to supplying lamps rated at 3 to 4 watts efficiency, as demanded. In the United States, the Edison lighting companies make no separate charge for lamps, which do not cost them 1s. each; and they do not mind breaking a high proportion, so long as the light is bright and attractive. Here, where the consumers have to find their own lamps at a cost of 3s. 9d. each, the case is altered. But even so, it is marvellous that nobody seems willing to confess to being in possession of reliable data, obtained from experience, of what incandescent lighting of a definite quality actually costs in the United Kingdom, including everything.

The Autumn Meeting of the Incorporated Institution of Gas Engineers.—In view of the autumn meeting of the above Institution, which is to take place in Liverpool on the 13th and 14th of October, the Secretary (Mr. T. Cole, Assoc. M. Inst. C.E.) has sent to the members a list of subjects suitable for papers. They take a wide range; and among them will be found several on which something fresh may be said to make the gathering instructive. It is pointed out that the papers are to be written in the third person.

ROBINSON ON STREET AND OTHER LIGHTING.

THE paper on "Electric Lighting by Municipal Authorities," which Professor Henry Robinson, M. Inst. C.E., read before the last meeting of the Incorporated Association of Municipal and County Engineers, as recorded in the JOURNAL for the 7th inst., is deserving of more attention than it seems to have excited. Although the oration of Mr. W. H. Preece, F.R.S., on the same occasion has aroused no small amount of criticism, and has thus so far monopolized the attention which electricians and gas engineers have been able to devote to the proceedings of the town and county engineers, it is not fair to Professor Robinson that we should continue in apparent forgetfulness of the fact that of the two recent compositions devoted to elucidate the mutual position of gas and electric lighting which we have published at length, his is far the more solid and instructive. Mr. Preece most undoubtedly overshadowed Professor Robinson before the municipal officials. But notoriety is not everything; and we are the more inclined to attach superior importance to Professor Robinson's paper out of regard for the fact that this author is actually engaged in carrying out an electric lighting undertaking for a Local Authority—the St. Pancras Vestry—while Mr. Preece has no such experience to lend weight to his brilliant and amusing speculations. Nor are we alone in proposing to take Professor Robinson more seriously than Mr. Preece; our contemporary the *Electrician* remarking with reference to the two papers, that "if Mr. Preece provided a more palatable discourse, Professor Robinson perhaps offered more nourishment." With this preface, then, we will go on to examine Professor Robinson's statements.

The paper in question is divisible into several parts, dealing with as many branches of the general subject. First of all, as he was addressing municipal officers, the author essayed to show the desirability of electric lighting being undertaken by municipalities. He then dealt with the cost of gas lighting, the cost of electric lighting, and the data of street illumination. On every one of these divisions of the paper we have something to say, not always in opposition to the author, but by way of supplementing his assertions and arguments with considerations necessary to be taken into account before anything like a conclusive judgment can be formed respecting the merits of his case.

To begin with, we dispute altogether the contention that electric lighting is a proper enterprise to be adventured upon by local authorities, and to be supported by the rates. The only respectable arguments that apologists like Professor Robinson can advance in support of the proposition that electric lighting should be provided by municipalities are, that this is the only way whereby the authorities can retain possession of the streets, and that by the same means they can prevent the creation of a "monopoly," and secure profits for ratepayers that would otherwise be taken by companies. Moreover, it is pleaded that since the necessary capital can be more cheaply found by municipalities than by private adventurers, the former ought to take advantage of the circumstance. If there are any other arguments on Professor Robinson's side of this question of municipal politics, we should be glad to hear of them; for not one of those cited will for a single moment hold water. Take the point of possession of the streets. Can it be maintained, as a general principle, that the local authority has a *primâ facie* claim to the assumption of any and every commercial undertaking that involves the use for a peculiar purpose—and even the exclusive use—of the subsoil of the streets? What about the Hydraulic Power Companies, Compressed Air Power Companies, and the rest of the ventures of the same type that accompany the concentration of town populations in these modern times? Clearly, it is not necessary that, because a speculative company seeks permission to use the streets—say, for a pneumatic milk-delivery system—therefore the local authority must straightway go into the business. The only rational policy of a local authority in such an eventuality would be to exact security for the proper execution of the distribution works, and the reinstatement of the road surface for its ordinary use; and then to stand aside and let the community enjoy whatever advantages the new service might be calculated to confer, and the undertakers participate in such reasonable reward as they are able to obtain. If the "possession of the streets" argument fails to be conclusive in the case of an electric light undertaking, the next plea, based on the supposed desirability of securing the profits of electric lighting for the ratepayers, is even weaker. Where is the electric lighting company that makes a profit? and is the business so far removed from the category of speculations that public money can safely be sunk in it? Lastly, does anybody seriously pretend that the mere circumstance of being able to raise money upon the rates at a lower rate than a solvent private trader can borrow, warrants a public authority in spending money so raised upon ventures that no prudent man would engage his capital in? These reflections may be commended to anybody who may have been inclined to agree that Professor Robinson proved the case for electric lighting on a large scale by local authorities. Trade is one thing, public duty is another. When a local authority representing a prosperous and growing district has no responsibilities save those accruing in connection with the practical working of self-government under ordinary conditions, it can raise money at a low rate, according to the current value of

gold, in view of its security being unexceptionable. Let the same local authority commit itself to heavy unproductive expenditure and engage in all sorts of speculative ventures of a commercial cast, and what will be the result? In regard to electric lighting, municipalities can get money cheaply for harmless little experiments which would not hurt them financially if all the capital were to be lost; but if, in municipal finance, every tub stood upon its own bottom, where would the electric lighting experiments be?

Professor Robinson's statements respecting the cost of gas lighting are fair enough on their face, although it is difficult to say when a case such as he states is really fairly put. All these essayists make great use of a supposititious "candle power" in computing the probable cost of gas lighting and electric lamps. But this proceeding may easily conceal a fallacy. It is safe to declare that the notion of "candle power" never enters the average gas consumer's head. Nor is there any reason why he should trouble to convert his unsophisticated, but natural and clear notions about good or bad lighting into conventional terms of the candle power, which only properly apply to photometrical testing. The ordinary consumer wants to use his gas differently in different parts of his house. He desires brilliancy in his dining-room—at least, on the table—chastened splendour in the drawing-room, sufficient light to see about the halls and staircases, and good working light in the kitchen. It is misleading to talk of candle power in connection with all these applications of gas, or to assume that all gas-burners used in a well-appointed modern house give the same duty. For the dining-room a highly efficient recuperative lamp may be (and often is) used, the duty of which with 16-candle gas will be from 8 to 10 candles per cubic foot of hourly consumption. If gas is used in the drawing-room, the lighting effect may be so interfered with by ornamental globes and shades that it would be pedantry to talk of candle power in connection with the gas consumed. And the passages may be lighted, as well as their use requires, by means of small, simple burners, which are only wanted to "show a light." How little the term "candle power" affects a householder is strikingly demonstrated by General Webber's observation in connection with the work of the Chelsea Company. He maintains that consumers are quite as well satisfied with 8-candle as with 16-candle lamps, provided there is nothing in the house to put the dimmer lamps out of countenance. It is inequality, in short, which strikes the eye more than intrinsic brilliancy: "See how the brighter light doth dim the less," &c. But, most unfortunately, the illustration works both ways; so that when an enterprising shopkeeper who patronizes electricity thinks to out-dazzle a neighbour who is so old-fashioned as to burn gas freely in butchers' flares, the humble batswing declines to be eclipsed by anything short of what the electrician calls his 64-candle incandescent lamps, and plenty of them—which run into much money.

Professor Robinson is not above making a comparison between the cost of gas lighting and lighting by electricity, in which the former is priced out at the highest London retail rate, while the latter is taken at the assumed cost price of 3¼d. per unit. It is true that he does not exclude the possibility that the unit of electricity may be charged at 6d.; but he qualifies the admission by asserting that this is "lower than *most* companies charge." Will Professor Robinson kindly name the metropolitan electric lighting company which serves a private house with 30 lamps at 6d. per unit? We are under the impression that the usual London rate is from 7½d. to 8d. per unit, with a high minimum, and that meter-rent and lamp renewals run into something considerable in addition, if the service is kept up to a smart average of brilliancy. It is practically impossible to estimate exactly what these extras ought to amount to; and nobody has yet published reliable accounts showing what the ordinary private consumer really pays for them. If such figures were to the advantage of the electrical supply companies, they would be placarded widely enough. But, as it is, it is truly remarkable how little is certain respecting the cost of electric light to the user beyond the price of the unit; and even that, as Professor Robinson's case shows, has a tendency to shrink in repetition.

Perhaps the most instructive section of the paper under notice is the last, which deals with the question of illuminating effect. This is a subject, as the *Electrician* admits, that receives very little attention from engineers. We must be permitted to remark upon this observation that, so long as electrical engineers persist in trammelling themselves with the Brush fiction of "2000 candle power" as the rating of the illuminating value of common arc lamps, anything like exactitude in measurement of arc illumination is not to be expected. Professor Robinson does not stultify himself in this way; but he states the formulæ for street lighting somewhat curiously. As the *Electrician* points out, he prefers to talk of the angle "below the horizontal line" through the source of light, in computing the relative intensities of illumination at various distances from the source. But, as our contemporary observes, "in optical science, the angle of incidence is always taken as the angle between the ray and the perpendicular to the surface." The consequence of this assumption is that the ray that would strike the ground vertically under a lamp would be stated to have the inclination O; and, being also the shortest, it would give the maximum lighting effect. The farther away the surface is from the vertical line passing upwards through the lamp, the less light it receives; its share being determined by the cosine of the angle of incidence. In practice, the electric arc lamp does not give the maximum illuminating effect at the angle O, but, as Professor Robinson puts it, "at an angle of about 40° below the horizontal line." With gas, however, there is no such disturbing element to upset the law of diffusion.

We have no more space to follow the author in his calculations. However, the whole subject is of great importance; and the Institution of Gas Engineers could not perform a more useful service to the community than to procure from some competent person, uncommitted to partisanship of either gas or electricity, an authoritative paper, for their autumn meeting, upon street-lighting efficiencies, with due reference to both theory and practice. This work is usually done in this country in such a slip-shod, rule-of-thumb style, that, although at this moment the street lighting of the City of London is being remodelled, an intelligent inquirer would ask in vain for information, expressed upon a scientific basis, about either the old or the prospective systems. The only rule for street lighting that operates with local authorities is to pay for gas as little as they can, and for electricity as much as they dare. Such minor considerations as the amount of illumination obtained, the difference in light received by the brightest and the darkest spots, the height of lanterns from the roadway, &c., are left to Fate and circumstances. So long as the electricians are at odds with precise measurement, nothing better can be expected from their side; therefore it behoves the gas industry to do something for the truth of science as applied to street lighting.

NOTES.

A Smokeless Furnace.

Favourable accounts are given in the *American Manufacturer* of the operation of the Murphy Smokeless Furnace, which is described as one of the oldest (if not the oldest) of successful furnaces designed for burning bituminous coal without the production of black smoke. The Murphy furnace differs from most others in having the coal introduced at the sides and fed towards the centre; while usually it is fed from front to back. The transverse section of the furnace is therefore of a flattened V-shape; and when applied to boilers, the fire is covered with a brick arch—hot air being supplied to the coal on admission to the grates through flues at the spandrils of the arch. The great point made by the patentee is that the air, when first brought into contact with the raw coal, shall be hot enough to ignite the gases evolved. By the time the coal reaches the grate, the bituminous part of it is consumed, and what remains is coke. This coke gets its air for combustion through the fire-bars in the usual way. The bars are kept in continuous movement; facilitating the regular descent of the fuel to the bottom, where a "clinker breaker" grinds the refuse into the ash-pit. A test of the Murphy furnaces made by the Chief Engineer of the Cambria Iron-Works, upon Babcock and Wilcox boilers, showed for wet slack an evaporative duty of 9·31 lbs. of water from and at 212° Fahr., over a trial lasting for 48 hours. The steaming capacity of the boilers was increased by one-third over the nominal makers' rating.

Steam-Boiler Economy.

The general subject of steam engines and boilers was recently discussed by Mr. John M'Laren, in a communication to the Federated Institute of Mining Engineers. The author remarked that twenty-five or thirty years ago there was great waste of fuel in connection with the steam plant of collieries in Northumberland and Durham. The egg-ended boiler, which happily promises to become speedily extinct, was then general. This kind of boiler, although of simple form, is not easily or cheaply kept in repair; and, being apt to ultimately explode, they are in the long run the dearest type of steam-boiler that can be employed. Cornish or Lancashire boilers, with a heating surface of about 14 square feet per horse power, are rapidly displacing the cruder pattern. Tubular or water-tube boilers are largely adopted on the Continent and in America, and are coming into limited use in this country. Their economy, however, is doubtful; they are given to priming, and a great disparity of results has been noted in reported tests. Mr. M'Laren thinks the locomotive type of boiler unquestionably the best and most economical steam generator in practical use. These boilers require no expensive setting, and are easily looked after. They can be stayed so as to be absolutely safe at pressures up to any practical limit; they occupy the least space of any boilers in proportion to their power; and they give an extremely high evaporative duty. There is an unreasonable prejudice against these boilers in the minds of some steam users, owing to their supposed greater wear and tear, though in practice they will be found, in the end, to cost no more for repairs than Cornish or Lancashire boilers doing equal duty. The evaporative efficiency of the different types of boilers may be stated approximately as follows: Egg-ended boilers, 4·6 lbs. of water per pound of fuel; Lancashire boilers, 8 lbs. of water per pound; tubular boilers, 7 to 10 lbs. of water per pound; locomotive type boilers, 11 lbs. of water per pound—all from and at 212° Fahr. According to Mr. M'Laren, the highest economy of both boiler and engine obtained in a properly authenticated experiment is

1-horse power (indicated) for a consumption of 1·35 lbs. of coal per hour, which is about 11·75 per cent. of the theoretical capability of the fuel used.

Flames Burning in Explosive Mixtures.

An interesting account of an apparatus for testing safety-lamps, and also for observing the phenomena attending the burning of a protected flame in an atmosphere containing combustible gas in noteworthy proportions, was recently given by Professor Frank Clowes, of the University College, Nottingham, through Professor Armstrong, F.R.S., to the Royal Society. The dangerous atmosphere was prepared in a wooden gas-tight box of about 100 litres capacity, fitted with a plate-glass window through which the lamp inside could be observed. Fire-damp was imitated by artificially prepared methane. The interior of the box was blackened; and the appearances of flame-caps over the lamp-flames were easily observable, even without a darkened room. Of many forms of safety-lamp tested in this apparatus, the one which most satisfactorily fulfilled the two purposes of efficient illumination and delicacy in gas testing was Ashworth's Improved Hepplewhite-Gray Lamp. This lamp is of special construction, burns benzoline from a sponge reservoir, and its flame is surrounded with a glass cylinder, ground rough at the hinder part. The wick of the lamp, when at a normal height, furnishes a flame of great illuminating power, which is turned down until it is blue and non-luminous, when a pale flame-cap is to be observed. In an atmosphere containing 0·5 per cent. of methane, the height of the flame-cap was 7 mm.; with 1 per cent., it was 10 mm.; with 2 per cent., 14 mm.; with 3 per cent., 20 mm.; with 4 per cent., 25 mm.; and with 5 per cent., the cap rose to 30 mm. The cap, which with the lower portions of gas was somewhat ill-defined, became remarkably sharp and definite when 3 per cent. and upwards of methane was present. From further experiments made in the above testing chamber with flames produced by mixtures of air with alcohol and hydrogen, it was found to be true in practice, as might be inferred from theory, that if the flame was pale and practically non-luminous, the size and definition of the flame-cap was augmented by increasing either the size or the temperature of the flame. It is interesting to note that with the Pieler spirit-lamp a flame-cap an inch in height was seen in air containing only 0·5 per cent. of methane. These experiments appear to open up a new method of analysis which might be explored with instructive results.

Does Punching Weaken Plates?

M. Le Van read, at a meeting of the Franklin Institute, a paper, on riveting, in which he defended the punching of holes in plates intended to be riveted, in contradiction of the conventional belief that for best work rivet holes ought to be drilled. The author observed that every engineer admits that punching has a more or less injurious effect upon the metal surrounding the hole; but he said that unfortunately no drilling apparatus in the market can compare with punching in rapidity and cheapness of working. He also mentioned a kind of punch which, instead of being flat on the head, is finished with a spiral face (looking something like a carpenter's centre-bit), the object of which is to shear out the blank by a progressive cut round the edge. This punch is only suitable for thin plates. M. Le Van argues that punching possesses so many advantages over drilling as to render it extremely important that the operation should be reduced to a system as harmless as possible for the material operated upon. With this view, it is laid down that no plates should be used in the construction of important riveted work that are not improved by the operation of punching; and certain experiments are cited to prove that good material is improved by punching. "That is to say, with properly-made punches and dies, by the upsetting round the punched hole the value of the plate is increased instead of diminished; the flow of particles from the hole into the surrounding parts causing stiffening and strengthening." This argument is supported by reference to the example of cold punched nuts, which are reputed to be stronger than nuts made in any other way. When a plate is found to be weakened by punching, M. Le Van declares that the material of which it is composed is not good enough for any important purpose.

Mr. Edward Sandeman, Assoc. M. Inst. C.E., Assistant Water Engineer to the Blackburn Corporation, has been appointed Water Engineer to the Plymouth Corporation.

Presentation to a Dundee Gas Official.—Last Thursday, the employees of the Dundee Gas Commissioners (office department) had a meeting, when Mr. Alexander Fyffe was presented with a travelling trunk and silver-mounted pipe, as a token of respect from his colleagues, on the occasion of his leaving the service of the Commissioners to undertake the duties of Chemist at the Avon Street Works of the Bristol Gas Company.

Mr. F. C. Hills.—We are asked to correct an error which inadvertently crept into the paper read by Mr. W. R. Chester, of Nottingham, at the recent meeting of The Gas Institute in Carlisle, as given in the JOURNAL for the 23rd ult. When alluding to the work of Mr. Claus in connection with the purification of gas, the author referred to "the late Mr. F. C. Hills." Mr. E. H. Hills writes to say that his father is still alive, though, unhappily, in very bad health.

TECHNICAL RECORD.

NORTH BRITISH ASSOCIATION OF GAS MANAGERS.

Annual Meeting in Edinburgh.

The Thirtieth Annual Meeting of this Association was held in the Victoria Room of the Waterloo Hotel, Edinburgh, last Thursday, under the presidency of Mr. ROBERT ROBERTSON, of Bathgate. It was gratifying to see that, in accordance with the general revival now being shown in the matter of local Associations, there was not only a programme of excellent subjects, but that much greater interest seemed to be taken in the proceedings. When these began, there was a good attendance of members; and very shortly the number was increased by some late arrivals—making up as good a meeting, probably, as any of the previous nine gatherings in Edinburgh. The President was accompanied on the platform by the following Past-Presidents: Mr. G. R. Hislop, of Paisley; Mr. A. MacPherson, of Kirkcaldy; and Mr. David Terrace, of Middlesbrough. The Association were also favoured with the presence of Mr. W. A. Valon, Assoc. M. Inst. C.E., of Ramsgate, President of The Incorporated Gas Institute; Mr. J. Hepworth M. Inst. C.E., of Carlisle, the Past-President; and Mr. J. West, M. Inst. C.E., of Manchester. The last-named gentleman had agreed to introduce to the meeting the subject of stoking machinery, which is, in many cases, the question of the future with gas-works managers. A word of commendation is due to the Secretary (Mr. R. S. Carlow, of Arbroath), for the arrangements he had made for the meeting. The room was probably the most comfortable the members of the Association had ever met in. But apart from this, which was a very small matter, the programme was a really interesting one. Mr. Robertson made a genial President; and after the business had once begun, he saw that no time was lost in carrying it on.

The PRESIDENT opened the proceedings by expressing his pleasure at meeting the members in "the ancient capital of Scotland;" and he said he trusted the gathering would be a successful one.

REPORT OF THE COMMITTEE.

The SECRETARY read the annual report of the Committee, as follows:—

The Committee now present the annual report in the form agreed on at the 1885 meeting; and the following statement gives a general outline of the business done, with some notes that may be interesting.

The Committee, at a meeting held in Glasgow on the 15th of October last, resolved to alter the date for sending out schedules for the compilation of the annual statistical report, from Dec. 31 to July 31 of each year. The Committee's reasons for so doing are as follows: (1) That a more correct report would be got at July 31, as nearly all the annual meetings of gas companies and corporations take place, and the price of gas is fixed, in June and July of each year. (2) That both the annual report of the proceedings and the statistical report would be printed at one time and bound together, and thereby a considerable deal of trouble and expense saved.

The Committee have been again successful in obtaining the consent of Mr. Blair, of Glenfoot, Tillicoultry, to offer his two prizes—one of £7, and the other of £3—to be given to the authors of the two best prepared papers "On the Advisability of Gas-Works Supplying Electric Light," and "On Utilization of Gas-Works Plant in the making of Cheap Gas for Gas-Engines, for Driving Electric Lighting Plant, and for Heating, Cooking, and in Direct Supply to Steam-Boilers." Intimations of these prizes, along with conditions, was given to members in a circular dated the 6th of April last. The Committee have received one paper from a competitor for the prizes, which is still under their consideration. The decision of the Committee will be published in the annual report of the proceedings.

The Benevolent Fund has not been drawn upon this year.

The Annual Report of the Proceedings, 1890, was published and sent to each member of the Association, according to the rules. It contained the President's address, papers and discussions thereon, a list of Past-Presidents, new members admitted, names of members of Committee, rules, balance-sheets, &c.

The Committee, at a meeting held at Glasgow on the 19th of March last, took into consideration the two questions put into the question-box at the last annual meeting, and which were remitted to the Committee to be dealt with.

Question No. 1.—"In the event of a concrete tank leaking, what is the best means of finding out, and material for filling up same?"

The Committee, after discussing this question at some length, and giving it due consideration, unanimously adopted the following motion: "That the particulars or details of this question were so indefinitely stated, that the Committee thought it neither advisable nor judicious to give a direct answer thereto."

Question No. 2.—"I would like very much to be informed if it is customary for gas companies to provide and maintain at their own expense the underground service-pipes of street lamps; if not, what is the usual mode of dealing with such?"

The Committee had a long discussion on this question; and, after due deliberation thereon, the following resolution was adopted: "That the practice in regard to this question may vary in different towns; but the Committee consider that the service-pipes should be thoroughly and solely under the control of the company or corporation supplying the gas, and that any renewals or repairs should be carried out by the supplier of the gas, and so make certain that the loss of gas should be as far as possible reduced."

The Committee, at their meeting held in Glasgow on the 10th of April last, had under consideration the advisability of visiting the Aberdeen Gas-Works, in order to inspect and report to this Association as to the working of West's drawing and stoking machinery, and also the coal breaking and elevating machinery at work there. The Committee unanimously resolved that they should visit the Aberdeen Gas-Works for the purpose of inspecting the said machinery, and that the cost thereof should be charged against the Research Fund. Since the date of their inspection of the machinery at the Aberdeen Gas-Works, the Committee have been successful, through the instrumentality of Mr. Smith, of Aberdeen, in

securing Mr. West, of Manchester, to read a paper at our annual meeting on his machinery; and Mr. Smith has also promised to take a prominent part in the discussion on the paper—giving his experience as to the cost of working that machinery as against the old system. The Committee therefore consider that a report from them on this subject would, to a certain extent, forestall Mr. West's paper. They have therefore resolved meantime to postpone giving any report; but those of the Committee who had the pleasure of seeing the machinery at work at Aberdeen will be better able to take part in the discussion on Mr. West's paper.

The Committee regret to announce that Mr. D. Bruce Peebles has seen fit to resign the office of Auditor to the Association; and the Committee have resolved, although with the greatest reluctance and regret, to relieve Mr. Peebles of the duties of his office, and have placed the name of Mr. R. B. Main, Glasgow, on the balloting-list as a fit successor to Mr. Peebles. The Committee have also resolved to recommend to the general meeting to-day that Mr. Peebles's name be added to the list of honorary members of the Association, in recognition of the excellent services he has rendered in being Auditor of the books for so many years, and otherwise contributing towards the success of the Association.

The Committee regret to state that they have been obliged to delete a number of names from the roll of membership, owing to deaths, parties resigning, and parties in arrear with their subscriptions. Still, it is gratifying to find that there are always a number of parties applying for admission as new members; thus showing that the Association is accomplishing the end for which it was originated.

On the motion of the PRESIDENT, the report was unanimously adopted.

THE ROLL OF THE ASSOCIATION.

The SECRETARY reported, with reference to the membership, that last year they had 156 ordinary, 61 extraordinary, and 5 honorary members, with 15 associates—making a total of 237. During the year they had had one or two resignations, &c., and several members had died.

The following gentlemen were admitted by the meeting as new members: Ordinary—Mr. J. Hepworth, M. Inst. C.E., Gas and Water Engineer, Carlisle; Mr. W. A. Valon, Gas and Water Engineer, Ramsgate. Extraordinary members—Mr. J. M'Kelvie, of Edinburgh; Mr. H. Darwin, of Glasgow; Mr. R. B. Whytock, of Glasgow. Associate—Mr. W. Stewart, of Brechin. The membership accordingly now stands at 233, made up as follows: Ordinary members, 151; extraordinary members, 61; honorary members, 5; associates, 16.

THE MURDOCH MEMORIAL FUND.

Mr. J. M'GILCHRIST (Dumbarton) handed in the report of the Murdoch Memorial Committee. They had, he said, clear funds in hand amounting to £317 17s. 6d. It had been proposed by the Memorial Committee, and had been accepted by the General Committee of the Association, that, next year being the centenary of gas lighting, they should do something with their funds in connection with Murdoch; and it had been proposed that they should apply to the Trustees of the Wallace Monument at Stirling, for leave to erect a bust of Murdoch, the inventor of gas lighting, in the Monument. There were already in that monument twelve very good Scotchmen; and if they were fortunate in getting the bust of Murdoch placed there, he could say that Murdoch would be in the right place, and in very good company. They had there already Robert Burns, King Robert the Bruce, John Knox, Sir Walter Scott, George Buchanan, James Watt, Hugh Miller, Adam Smith, Dr. Chalmers, Tannahill, Livingstone, and (last, but not least) Carlyle. He hoped the meeting would endorse the action of the Committee, and give them the necessary power to make their application. If all went well, he expected that next year, at the time of their annual meeting, they would all be invited to attend the unveiling of the bust of William Murdoch in the Wallace Monument.

The PRESIDENT thought the suggestion by the Committee was a very good one, because, if carried out, the bust of the great pioneer of the gas industry would be located in a suitable place. He had much pleasure in moving that the report of the Committee be adopted, and that it be remitted to them to carry out their proposal.

Mr. A. MACPHERSON (Kirkcaldy), in seconding the proposition, said that the cost of the bust would only utilize a part of the money the Committee had; and they did not give up the hope of having a still more worthy memorial of Murdoch. In the meantime, however, he thought they might mark the centenary by carrying out the present proposal.

The recommendation of the Committee was agreed to.

THE FUNDS OF THE ASSOCIATION.

Mr. D. BRUCE PEEBLES (Edinburgh), the Auditor, read the Treasurer's report, which showed, in the General Fund, a charge of £143 18s. 1d., and a balance of £15 9s. 8d.; in the Benevolent Fund, a charge of £231 5s. 1d., and a balance of £222 17s. 1d.; and in the Research Fund, a charge of £83 17s. 10d., and a balance of £71 16s. 10d. He thought they might well congratulate themselves on having a very good showing this year—a better one than last. This year he had resolved to resign the office of Auditor. Auditing the books of the Association had all along been a very pleasant bit of work for him. Mr. Carlow had brought them to a state of perfection; and there had not been a single error this year, and not a thing requiring inquiry. He thanked all the members for the courtesy and kindness he had received during the many years he had had the pleasure of being amongst them.

The PRESIDENT said they had all listened with pleasure to the report by the Auditor. Their funds were in a position which augured well for the Association. He was sure they would be prepared to give Mr. Peebles their heartiest and warmest thanks for the great care and trouble he had taken in auditing the books—not for this year only, but for the 15 or 16 years he had been their Auditor. He proposed that they should give him their thanks, that this should be recorded in the minutes, and that they should make him an honorary member, which was the least they could do.

Mr. J. M'GILCHRIST (Dumbarton) seconded the motion. He said he felt that, altogether apart from Mr. Peebles's services as Auditor, he had, as an inventive genius, been a credit to the Association. He was a gentleman to whom they could always go for a paper in case of necessity, and he would give them not only a paper to fill up a gap, but one which was teeming with interesting opinion.

The motion was agreed to.

Mr. PEEBLES thanked the members very sincerely for electing him an honorary member. It was, he said, an honour which had come upon him unexpectedly, and he might say very undeservedly, for he could not think he had any reason to expect it. He hoped that their next Auditor would continue in office as long as he had done, and that sixteen years hence they would be able to meet that gentleman in the same manner as they had met him (Mr. Peebles).

The SECRETARY read a letter from Mr. S. Stewart, Greenock, expressing his regret that, in consequence of his not being sufficiently recovered from his recent illness, he could not risk attending the meeting of the Association.

The PRESIDENT then delivered the following

INAUGURAL ADDRESS.

Gentlemen,—I thank you very sincerely for the great honour you have conferred upon me by placing me in the President's chair at this, our thirtieth annual meeting. I value the honour all the more when I consider my position among you—a Manager of one of the smaller gas-works. While honoured and pleased, I feel the task of saying anything worth listening to a difficult one, more especially in these times when presidential addresses of much merit are being reported almost weekly. I seem not altogether in my right place; and I think one of our number, more capable of giving an original address founded upon his every-day experience in a larger field of labour, might have been chosen to address you. I anticipate, however, your kind indulgence, and also your help, in carrying out this day's programme.

The continued prosperity of our Association must be gratifying to all of us. Its steady onward progress, always keeping abreast of the times, shows clearly its adaptation to the object for which it was instituted—viz., "For the encouragement and advancement of all matters connected with gas engineering and manufacture, and to facilitate the exchange of information and ideas amongst its members." This object has been carried out year by year since the Association was formed; and no small part of the progress of the gas industry is due to these and such-like fellowship meetings, and the subsequent intercourse between gas managers brought about by the meetings. When we contrast the present with the past, and think of the good fortune of the young gas manager of the present day, we cannot help expressing the hope that he may fully appreciate and make the most of the advantages which the increased facilities of acquiring knowledge bring to him. It is a matter of surprise to me that so few young Scotchmen, who are doubtless looking forward to the time when they may fill our shoes, put the study of the details of their profession to the test by entering for the City and Guilds of London Institute Examinations in "Gas Manufacture." A few have entered and passed well, but comparatively few; and I do not see why it should not be otherwise. The passing of such an examination will not make a manager. But the fact of his having passed shows he has a grasp of the subject he has been studying; and when this is combined with practical experience, it must make him all the more efficient.

It is a matter for congratulation that the demand for the commodity we manufacture and sell is still largely on the increase (notwithstanding the encroachments of rival illuminants), and that gas stocks are to-day as firm as ever they were. The confidence in them, shaken somewhat when the electric light was first brought forward, has been regained, and to all appearance has been much strengthened—to the annoyance of the timid people who sold out when the scare about the new light was in vogue. The demand for coal gas increases amazingly year by year; showing that gas is still the good, old, and tried friend of the public. The statistics of the gas manufactured in the capital in which we are now met need only be mentioned as exemplifying this fact. Compared with last year's production, there is an advance of 100 million cubic feet; and the same rate of increase has been recorded in many of our large centres. And, further, we rejoice that a good part of this is due to extra day consumption. The prejudices against gas as a cooking agent have been gradually removed; and what was claimed by us years ago is now admitted on all hands—that gas is the most economical, convenient, and cleanly mode of cooking yet introduced.

I dare say the majority of you will have had a like experience to my own in the matter of gas cooking-stoves. I have not yet had returned one of those sent out from our works on hire; and with few exceptions they have been eventually purchased by the hirers, which itself speaks well for the success of gas in that department. The extra day consumption is also attributable in part to the success of the gas-engine; and on

the expiration of the patent rights, we hope to see a more general use of this motive power. The high price of the engine—not only its first cost, but the high price of the new slides required periodically—is the most serious drawback to its introduction. Gas as a motive power having been proved to be more economical in practice than hydraulic or electric power, and much more reliable than the latter, it will, I am sure, on the removal of this barrier, come more into use. We cannot say that the same perfection has been attained in the application of gas to heating purposes. The ideal has not been reached here; and, with the exception of its use as a water heater, gas has so far failed to supply the place of the coal fire on the score of economy. So there is still scope in that line for the inventive genius of our gas engineers and stove makers.

Looking from the past success of gas to its future, and remembering that this success up to the present has been due to its cheapness, reliability, and convenience, we may question ourselves as to the possibility of this increasing demand being reversed. We need not consider the possibility of any rival illuminant ousting gas on the score of reliability and convenience. There is none. But what concerns us most is the danger of a decreased demand, induced by a necessity for raising the price to such a figure as would give the more expensive and brilliant light a chance to supplant it. Cannel coal, on which we just now entirely depend for our present supply of good gas, has, during the past year, risen in price to such an extent as to cause the majority of gas companies in Scotland to advance the price of gas. These advanced prices are still outside the competitive range of electricity and oil. But there is every prospect of a still further increase, owing to the Continental demand for high-class cannels; and keeping in mind that cannel is becoming year by year a more limited commodity, we cannot look for anything but still higher prices. To reduce the present high standard of luminosity by the use of cheaper coal, that gas may be kept at a low price, would, in my opinion, be a false step, in the face of the continued demand for more light. The efforts put forth by our American brethren to produce gas of high luminosity, so as to compete more favourably with the electric light, confirms the opinion of the majority of Scotch managers, who hold that a high standard of illumination ought to be maintained, and shows us that there is, perhaps, after all, a great amount of truth in what the chairman of one of the electric light companies said in explanation of the non-success of the new light in Scotland—viz., owing to its being there met by a strong competitor in the shape of the rich coal gas supplied.

Being brought face to face with the difficulty of producing a rich gas at a cheap rate when cannel is rising in price, it is gratifying to see that there is a possibility of the removal of that difficulty. The activity shown by gas managers and chemists in their endeavours to practically apply the old theory of enriching coal gas by oils, is significant. That the difficulties hitherto encountered in this direction will ultimately be overcome, I have not the least doubt. Success in this, combined with the introduction of more economical methods of working, will enable gas to hold its own as the cheapest light for years to come.

Turning to the progress of our rival illuminants, foremost, though not most formidable, we must place the electric light. Its progress during the past year has in no way curtailed the sale of gas; and I think we may yet safely place the electric light in the same category as it has been in since its introduction—the "light of the future." Unless the cost of its production can be very much cheapened, we have no reason to fear encroachments of the electric light, either in private dwellings or in our streets; and cheapening seems scarcely possible when we consider that at the present time upwards of 90 per cent. of the power expended is converted into light. It is also a significant fact that week by week we read of local boards and corporations who have adopted the new light, falling back upon gas as being more economical and reliable. The great field of the electric light appears to be for advertising purposes, and as a luxury to those who are willing to pay for it.

Leaving this competitor, and coming to our less brilliant rival, paraffin oil, we find in it an opponent of a far more serious kind. In our smaller towns, distant from the coal-fields, the rivalry of oil is much felt, owing to the necessarily high price of gas. In our larger towns and cities also this opposition, although perhaps not felt, exists; many of the well-to-do people adopting oil because of erroneous views as to its superiority over coal gas. The difficulty of meeting this competitor in the first case is not an easy one for the gas manager. A consumer is able to buy a bottle of oil for 1½d. or 2d., but a quarter's gas account would appear ruinous to him. It is needless to point out to him the relative lighting values of gas and oil; for, as a rule, he is contented with a smaller light when burning oil than he would be if using gas. The only solution of the difficulty seems to be the placing of the gas consumer on the same footing as the oil consumer, by adopting a system of short payments, either by weekly collection or by prepayment meters. I believe Mr. Keillor, of Nairn, has applied the principle of weekly payments successfully among a class of consumers who would otherwise have resorted to oil; and other managers similarly placed might take the hint and do likewise. With regard to oil as a competitor of gas among the better classes, it would be well if the attention of these classes could be drawn to the fact that, in burning our ordinary commercial Scotch paraffin oils and petroleum, more sulphurous fumes are given off (to the extent of from 20 to 60 per cent.) than by burning coal gas; and I think no better way of enlightening them on this point could be found than by the circulation of the excellent paper read at one of our meetings by Mr. A. Bell, of Peebles, on "The Presence of Sulphur Compounds in Illuminating Mineral Oils."* It would be well for us who feel this opposition to get this paper (which is in pamphlet form) and make good use of it.

The facts arrived at by Mr. Bell, after careful experiment, thoroughly confute the statement made in a booklet issued by a large firm of lamp makers in Birmingham, who always keep their country merchants well supplied with literature showing the advantages to be gained by adopting their goods. After describing the advantages oil-lamps have over gas—as being more easily carried about from place to place, and so on—this pamphlet says: "But lamps possess some other very decided advantages over coal gas, inasmuch as they do not load the atmosphere with sulphurous fumes; leaving the air much purer for breathing, while the books, pictures, brass fittings, and hangings do not become affected as in rooms where gas is burned." It has been demonstrated that paraffin oil or petroleum, burned under the best conditions, gives off sulphurous fumes to a great extent. But there is an additional drawback to its use, in the disagreeable smell that arises from its incomplete combustion (not to speak of the unpleasantness of handling the oil itself); for in four cases out of six, consumers do not know how to clean their burners, or do not care whether they are cleaned or not—unless, perhaps, they get a rub up on the outside. The result is that disagreeable fumes are given off peculiar to the houses where oil is burned. The gas consumer notwithstanding his education in the burning of gas to advantage being somewhat deficient, is better placed than the oil consumer.

We also find that paraffin oil and petroleum have entered the field as competitors with gas as producers of motive power. These oil-engines will be extremely handy in places where there is no gas; but I am afraid they will have no chance alongside the gas-engine.

In keeping our own in this rivalry with oil and electricity, our attention cannot be too often drawn to the necessity for us making the education of our customers in the use of gas one of our chief duties. We should see that the pipes put into new buildings are large enough, and point out to the proprietor the benefit he will derive by supplying himself with fittings of a substantial and sufficient kind; and to all our customers we ought to show the greatest courtesy—attending promptly to any grievance, so that they may see that we are working for their interest as well as for our own.

In addition to paraffin oil and electricity, we have in the field other illuminants; but these we can hardly place under the head of rivals. I refer to water gas and oil gas. By themselves these gases have not been a commercial success, whatever good fortune there may be before them in combination with coal gas. The "hue and cry" about water gas raised a year or two ago has died down almost as speedily as it got up. The statements about its low price have been proved to be very much exaggerated; and, unhappily for the shareholders, it may safely be concluded that it has been found impossible to produce it on such an economical basis as was prophesied. I had an opportunity of looking into the works at Uddingston some time ago, and I cannot say that I was favourably impressed with the light. I suppose its manufacturers do not care to see intruders, for I had no opportunity of testing its illuminating power. Gas made from oil directly, although in the field, like water gas, for many years, has not been made at a cost low enough to enable it to enter into competition with coal gas, although the promoters of the many schemes for its production have, by a manipulation of figures, endeavoured to show, from its enormous illuminating power, how much more valuable it is than coal gas. In addition to the extra cost per 1000 cubic feet, there is the drawback of its impurity. One of the "facts" stated is that it is "free from sulphur, ammonia, &c.;" but, unfortunately, these "facts" will not stand investigation. Reference has before been made at our meetings to the large amount of sulphuretted hydrogen present in gas made by these systems.

The Gas Company at West Calder have recently adopted the "Mansfield process" for making gas from oil. The town has been supplied with gas from Young's Paraffin Oil-Works there for a number of years back; but the local Company, having found they were not getting the gas at a remunerative price (so much being lost through condensation between the oil-works and the holder—a distance of fully a mile), looked about them to see if another method could be adopted. Unfortunately, the lease of the ground on which the holder is erected is so drawn up as to prevent the Company erecting retorts for the carbonizing of coal. The Superior was approached to see if any arrangement could be made with him; but the only concession he made was to allow the erection of plant for making oil gas. The whole system is complete and easily wrought, and a great improvement over some other oil-gas apparatus, in so far as the gasholder rises under pressure instead of vacuum, as in the other kind.

The apparatus consists of a circular generator, in which is

* See JOURNAL, Vol. LIV., p. 403.

placed an iron retort of much the same shape as the ordinary laboratory glass retort. From this the gas is led into a hydraulic box, and thence to the holder. The oil is run from a small cistern overhead into the retort, where it is decomposed and converted into fixed gas. There is no purification; the gas being led direct from the hydraulic box to the holder. The method is extremely simple; but, as you may suppose, the gas is not free from sulphuretted hydrogen, although the makers, in their prospectus, give out that the gas is "quite free from sulphur, ammonia, or sulphuretted hydrogen, and consequently is purer than it is possible to make coal gas."

I am afraid oil gas by itself has proved to be neither so economical nor nearly so pure as coal gas. In combination with our present mode of carbonization as an enricher, we may, however, look for it to become in a short time a very valuable adjunct. The many schemes which are now on trial, and which have been fully described lately, will be watched by us very attentively, in order to ascertain their merits.

Having dealt in a rather desultory manner with things outside the works, I will now look at some of the recent improvements that have taken place in gas-works plant. Beginning with the retort-house, this section of the works seems to be undergoing a thorough revolution, however slowly. Only ten years ago the system of regenerative firing was comparatively unknown; but to-day the advantages of this mode of heating have been so well proved, that its adoption has been very general, not only in our large, but also in our smaller works. There are now few works that are not laying aside the old wasteful method as a thing of the past. Our attention is to be drawn to this system of firing in a paper to be read to-day.

The system of inclined retorts reminds us of the oil-works benches we see in many parts of Scotland. That the plan has great advantages is quite apparent; but it comes to a point whether that or the present system of horizontal retorts, with the addition of drawing and charging machinery, is the more economical. From practical experience, it would appear that both are very much on the same footing with regard to economy; and if so, there is every chance of the present system of horizontal retorts, with the addition of machinery, having the preference. The managers of the smaller works will have to rest content with drawing and charging by hand for some time; this being, in their case, as yet, the most economical plan. Talking about improvements in retorts, I am surprised that nothing further has been done to carry out the combination of horizontal and vertical retorts for the recovery of ammonia from the coke, or the production of water gas for firing purposes, as was suggested by Mr. William Young at one of our meetings some time ago.

Passing on to purification, it must be a matter of regret to us that purification in closed vessels has not been so successful as was anticipated a few years ago. By this time we expected all the disagreeable odour from the changing of purifiers would have been obviated; but our expectations have not been realized. Difficulties in the practical working of the system have cropped up, and debar it at present from being a complete success. The partial failure of this scheme does not affect us further than the regret we have at seeing such an ideal form of purification hampered in its working; for the present system of dry purification has been so much improved of late as to make us content with such things as we have. The introduction of air or oxygen for the continuous revivification of the purifying materials has done much towards avoiding nuisance.

The labour troubles still cling to us, and it seems that a solution of this difficulty will not be arrived at in a hurry. The spirit of unrest among gas workmen, as well as in other departments of labour, kept up by the paid agitator, is a matter of anxiety to the gas manager. It is to be hoped that, with his usual tact and fairness, he will be able to overcome this difficulty in the coming winter.

The better state of the bye-products market must be consoling to us, in face of the advance that is taking place in the price of coal. We trust there is some truth in the report that the sources of nitrate of soda are failing. This, combined with the tendency there is on the part of farmers to return to sulphate of ammonia as a manurial agent, bids fair to bring sulphate up to a more remunerative price. It is now generally known among farmers that the fertilizing power of sulphate is greater than that of nitrate; and I hope the Sulphate Association will make the most of the excellent paper read at The Gas Institute meeting last month by Mr. Ritson, of Jersey.*

An effort should now be made to complete the sum necessary to raise a fitting tribute to the memory of our great pioneer, William Murdoch. Next year will be the centenary of the advent of gas lighting; and it would be a most fitting time to get this done. I am sure I shall not appeal to you in vain, but that you will all willingly re-subscribe, and have completed next year what has been our desire for some time past. We surely cannot grudge a little for the purpose of seeing something done to perpetuate the memory of the man whose name we all revere, and who, by the introduction of gas lighting, did so much for the advancement of civilization.

I cannot close my remarks on this occasion without referring to the loss the Association has sustained through the deaths of Mr. G. Niven, Gas Manager, of Airdrie; Mr. Thomas Elliot, Gas Manager, of Kirkcudbright; Mr. James M'Kelvie, Coalmaster, of Edinburgh; and Mr. Henry Walker, Coalmaster, of Bathgate—all members of our Association, who though not taking so active a part in its work as others, had a deep interest in its welfare. On your behalf I would express the sorrow of the Association at their loss, and its sympathy with their bereaved relatives.

I thank you for the very patient hearing you have given to these somewhat rambling remarks on some of the present-day topics of the gas industry; and hope our Association will go on flourishing in the future as it has done in the past.

Mr. W. A. Valon (Ramsgate) said he had much pleasure in proposing a vote of thanks to the President for his excellent address. He (Mr. Valon) was a young member of the Association; but he was glad to say he was one, and hoped to remain one for many years. He had further to thank the members for having elected him. In proposing this motion he had to say that the President had given them a sample of his wide reading and practical knowledge. He had travelled over the manufacture of gas inside, and had given them a view of what was the position outside. When they came to read the address, ruminate over it, find out its good points, and learn the lessons the President wished them to learn upon those subjects upon which he was so well qualified to speak, they would consider they were well repaid for their trouble.

The motion having been cordially agreed to,

The President thanked the members for the kind manner in which they had received his address, knowing, as he did, that there were a great many imperfections in it. In these days of science and research in the gas industry, raising it to a high state of perfection, it was a difficult task for one to read an Inaugural Address. There were a great many of them in the field every week; and very little new matter could be brought forward. It was owing to this that he felt his unfitness for the position he had taken up that day. If there was anything he had said or done that would tend to advance the interests of the Association, it would give him great pleasure indeed. He thanked the members very sincerely for the manner in which they had received his address.

Mr. G. R. Hislop (Paisley) then read the first paper, on

A NEW FORM OF GAS-BURNER SPECIALLY ADAPTED FOR GAS-TESTING PURPOSES.

Gentlemen,—It is just three years since I had the privilege and pleasure of laying before the members of this Association my views upon a new departure in the construction of union gas-burners,* and proved to them, by a tabulated set of experiments, the importance of the principles I then propounded—viz., that the angle of impingement of two jets of illuminating gas has a most important bearing upon the character of combustion and intensity of light emitted by such gas. I pointed out also the insuperable difficulties experienced in procuring test burners having their orifices drilled at certain angles. To-day I purpose following up this subject a little further, and showing you how I propose to overcome the difficulties referred to. It is just possible I owe an apology for again introducing this subject; but the importunity of your President must be charged with the infliction, should it prove one. I may state that the instrument which forms the subject of this paper was designed by me in connection with my former paper; but the time then at my disposal did not permit of its production. I am, however, not without hope that its production now will meet with some measure of appreciation from the members of the Association. This instrument I have designated "The Angleometer Union Gas-Burner." The practical application of it I shall endeavour to explain to you.

In my former paper I pointed out that, in order to carry out my experiments upon the various qualities of gas, I was compelled to have a considerable series of burners specially made to suit various qualities of gas ranging from about 18 to 32½ candles, and having their orifices drilled at different angles off the vertical line. All this is now, however, admirably accomplished in this one burner; supplying as it does a most effective and speedy means of producing the angle of impingement under which any quality of gas will emit the highest intensity of light consistent with, or in conformity to, the existing statutory regulations contained in the various Acts of Parliament. To find the angle, therefore, at which any quality of gas ought to be tested, it is only necessary to alter the inclination by means of a screw adjustment; and this may be accomplished by two methods. The adjusting mechanism necessarily secures constant contact of the burner tips, as also the orifices at a fixed distance; and this secured, it is necessary only to increase or reduce the angle of inclination to produce a flame having the exact extent of elongation, and so as to be just under smoking-point.

The importance of securing such a uniform condition while testing all qualities of gas, will be at once apparent—a point which, in the tabulated experiments, I proved to you affects the luminosity of the gas to the extent of from 0·11 to 0·18 candle for each degree on the series of tests made. Taking, for example, a gas of 22·25-candle power, I showed you that, at the angle of 22° off the vertical line, or a total angular distance from each other of 44°, gave the highest result obtainable; the

* See Journal, Vol. LVII., p. 1304.

* See Journal, Vol. LII., p. 205.

dimension of the flame being $2\frac{7}{16}$ inches broad by $3\frac{9}{16}$ inches high, while with the same gas tested with the impinging jets placed at an angle of 45° off the vertical line, or a total angular distance from each other of 90°, producing a flame $3\frac{1}{16}$ inches broad by $2\frac{9}{16}$ inches high, the lighting power was reduced to 19·71 candles—being a loss of 2·54 candles, or 11·42 per cent., or 0·11 of a candle per degree over the whole series of tests made on the gas of this quality. Similarly, gas of 23·8-candle power was found to lose, between the angles of 24° and 45°, 2·53 candles, or equal to 10·63 per cent. On a gas of 26·29-candle power, and tested between 28° and 45°, the loss was 2·51 candles, or equal to 9·55 per cent. Again, with 28·4-candle gas, tested between 33° (as the most effective angle) and 50°, the loss was 2·4 candles, or equal to 8·46 per cent. Gas of 30·28-candle power, tested between 38° and 50°, showed a loss of 2·16 candles, or 7l·4 per cent.; and, finally, 32·6-candle gas, tested between 45° (as the most effective angle) and 55°, gave a loss of 1·8 candles, or equal to 5·6 per cent. It will thus be seen that the loss and liability to error are greater in the case of the lower qualities of gas; but this is as may be expected, since with the latter there is much greater liability to over-oxidation. Again, burners are generally made with their orifices drilled at angles much too high for the lower qualities of gas. The risk of error and loss are consequently much greater in testing the latter.

Having now so far explained to you in words the difference due to angular distance, I proceed to give some ocular proof of the force of my statements. The instrument before me is set to the angle of 47° off the vertical; and you will observe that the horizontal dimension or breadth of the flame is much more than the vertical height. Presuming the quality of Edinburgh gas to be actually 27 candles, the illuminating power of 5 cubic feet will be, as I am now consuming it, say 24 candles. But if I now alter the angle of inclination of the jets to 28°, as being the most effective angle for that quality of gas, the illuminating power would be raised to 27 candles; the difference representing a gain of 12·5 per cent. The alteration of the angle, you will readily observe, produces a very marked change, not only upon the dimensions of the flame, but upon the amount of light emitted from it. It will thus be seen that the "Angleometer Burner" embraces the entire range of angles under which my former experiments were conducted, or are ever likely to be required in testing illuminating gas. The practical result of the elongation of the gas-flame is the combustion of the gas under conditions equivalent to a reduction of 2-10ths of an inch pressure at the point of combustion, while the pressure of 5-10ths is maintained in the jet. This burner therefore offers great advantages to all gas examiners and managers in testing any quality of gas; and since every quality has its appropriate angle, the instrument is speedily adjusted to that angle at which it will eliminate the highest amount of light compatible with, and in due conformity to, existing Acts of Parliament regulating gas supply.

But some may be inclined to ask the question whether, after all, the burner answers the description of a union gas-burner as defined by the Board of Trade. I answer, "Most certainly; it is truly a union jet, but with adjustable angles." Angles in relation to quality have hitherto never been thought of, and consequently never defined; and thus the matter of angular inclination of the jets to each other has been left entirely to the mercy of will or accident, as the case may be, only the burner shall have two holes (which constitutes a union jet), just as a human being has two eyes, but with the result not less varied than the visual power of the human eye itself. Such Acts of Parliament should consequently in the future contain a qualifying clause to the effect that the standard 5 cubic feet of gas per hour "shall be tested by a union jet capable of relative angular adjustment, in order to the perfect combustion of the gas."

After what I have stated, it will be readily conceived as possible to construct a scale of flame dimensions which shall approximately indicate the illuminating power of 5 cubic feet of any quality of gas; and this I hope to accomplish.

It is almost unnecessary that I should dwell longer upon the principles I have enunciated in this and in my former paper. Much has been said and written upon the question of gas-burners for general use, and many attempts have been made to introduce reform. But however much has already been done, burner makers are not easily enticed out of old beaten paths. I find, for instance, that many difficulties are said to be in the way of making burners of the various angles required, although I fail to see why it should be so; and I am not without hope that these principles will be carried out in practice.

My special business to-day, however, is to provide the gas manufacturer and analyst with the best means of determining the illuminating power of all qualities of gas, and that under exactly uniform conditions, considered in relation to the composition of the gas. I have already shown you that the range of error or loss in testing gas—say, of the quality supplied to this city—amounts to 3 candles. But assuming that only one-half of this loss is sustained by defective angular impingements of the gas-jets, we have 1·5 candles loss, which I confidently affirm is not overstated. With gas as now supplied here at the rate of 4s. 6d. per 1000 cubic feet—but taking the actual cost to the Corporation at 3s. 6d. per 1000 cubic feet—for $25\frac{1}{2}$-candle gas, as now tested by the best means available, we have the rate per candle of 1·55d. exactly on the average, but in reality something like 2d., as the cost per candle within the range of error indicated, owing to the higher class of coal required for its production. Now, 1·5 candles at 2d. per candle equals 3d. per 1000 cubic feet, which, on the quantity of gas sold in Edinburgh and Leith during the past year—viz., 1,239,973,000 cubic feet—amounts to £15,499 13s. 3d.

It is unnecessary to point out that such loss does not apply to this district alone, but to all corporations and gas companies supplying similar gas (the one I represent not excepted). But where lower qualities are supplied, the loss may be much greater. This loss, however, it will be borne in mind, falls in the first instance upon the gas manufacturer, and not upon the consumer, as presently considered. My purpose now is chiefly to show the means by which the gas manufacturer is justly entitled to take credit for supplying to gas consumers a much better article than he has hitherto had credit for, and at the same time conforming to the conditions of proof as to quality contained in the Act of Parliament or otherwise. No doubt the effect woule be to increase the difference of loss as between the results so obtained and those realized in ordinary domestic and factory lighting; but I have the satisfaction of having, in my former communications, propounded a remedy, to some extent at least, for such loss in their case also, which might be carried out if only "time" to me and "the will" were present with the burner manufacturers. In the meantime, I content myself with having directed your attention to certain important and hitherto overlooked conditions, which I have endeavoured to prove are all-important to you and to me in their financial and economical aspects.

While the instrument which has been the subject of this paper is specially applicable only to gas-testing purposes, I propose to make it at the same time applicable for ordinary use, as, whatever rights we may claim for ourselves as gas manufacturers, the claims of the gas consumers must ever receive our special consideration. As I stand before you to-day, I have fresh upon my memory the first paper I read in the interest of gas consumers, to the members of this Association, and in this city, 23 years ago, when I enunciated my views upon what may be regarded as amongst the first attempts at the so-called modern system of regenerative gas-lamps—viz., that of covering the tops of all gas-shades, and furnishing them with a controllable ventilating device, so as to consume the gas in a heated atmosphere—a system which was recently made the subject of a patent by a Glasgow gentleman.

And now, while thanking you for your attention, I have only to say I shall be glad to further explain to any who may desire it the principles and working of the "Angleometer Burner."

Discussion.

The PRESIDENT said the members had now heard the paper, and followed out the details of the illustrations, and he hoped they would discuss the points of the communication.

Mr. D. BRUCE PEEBLES (Edinburgh) said that everything Mr. Hislop brought before them always showed a great deal of honest and hearty work. He had gone into this question very ardently, and in the paper he had read that day had shown clearly that he had attacked a subject of very great importance to gas producers and consumers. He thought, however, that in the instrument exhibited, he saw a little bit of a grandchild of his own. Many years ago he produced an appliance wherein two gas-burners were automatically arranged so that they left one another and then coalesced. Some years afterwards he read a paper to the Association, and exhibited before them an arrangement in which two burners were brought together so as to show the increased illuminating power by this operation. This could be arranged at certain angles; and he must say that Mr. Hislop had followed this up, and produced a very beautiful instrument, which would very much more clearly give the different angles required. The difficulty he (Mr. Peebles) found in connection with burners was to know what the various angles should be for different qualities of gas. This was a point which had been very clearly brought out. He could remember the type of flame that Mr. Hislop had just shown. It was known all over the world before Mr. Bray brought out his burner. Mr. Bray produced a flame of more brilliancy, but of less illuminating power. Mr. Hislop's paper was so interesting, that it should lead to a great deal of discussion. There was no doubt the ideas put forth had been brought out before in London; and they might be taken up now in connection with Mr. Hislop's method of increasing the illuminating power of gas. He (Mr. Peebles) remembered very clearly Mr. Hislop's former paper, and that he gave them a very good illustration of the necessity, in burning gas, of allowing the proper quantity of oxygen to go through to secure perfect combustion. There was another point which was brought before them long ago by Mr. Hislop in connection with this matter—what was called the Methven Screen. Mr. Hislop long ago employed a similar method, where the hole, instead of being rectangular, was simply circular. Mr. Fiddes, of Bristol, deserved the credit of having introduced that system.

Mr. A. SMITH (Aberdeen) asked if the same quantity of gas was being consumed in the first flame shown as in the second. He thought Mr. Hislop had stated that the pressure was 5-10ths in the first flame, and reduced to 3-10ths in the second. The former appeared to him to be a little "wiredrawn;" and the latter he did not think would be a pleasant one to the eye. If, however, they could get anything to raise the quality of the gas 3 candles, it would be a great thing indeed.

Mr. R. MITCHELL (Edinburgh) said that Mr. Hislop had very

kindly referred to the quality of the Edinburgh gas. Perhaps it had not been his fortune to have to experiment with the same quality of gas, and therefore his burner did not altogether suit the Edinburgh gas. They strove at all times to give 27-candle illuminating power; but in the West they only supplied 18, 19, and 20 candle—nothing more. He thought if Mr. Hislop had had a little more experience with the Edinburgh quality of gas, he might have had a more efficient burner to suit it. They were, however, very much indebted to him for bringing the subject before them, for he had been very successful with his arrangement. It was one of those things which might, in due time, come to be of service to the general public.

Mr. A. MacPherson (Kirkcaldy) thought that the members all acknowledged that they were indebted to Mr. Hislop for his present paper, and also for one he read on a former occasion. He (Mr. MacPherson) considered that in the last paper Mr. Hislop had very clearly demonstrated to the Association the great benefit to be gained by having burners pierced at various angles for different qualities of gas. This, he thought, Mr. Hislop had carried a step forward; and although at that time he was unable to illustrate what he had found to be the case, he showed it to them that day, and he (Mr. MacPherson) considered he had clearly made out his case. He thought they had only to look at the second flame, and compare it with the first, to see the difference between the two. He was of opinion that the illuminating power of the second flame was much superior to the one they saw before the altering of the angle. He thought Mr. Mitchell must have misunderstood Mr. Hislop's description of the burners, because it clearly pointed out that with a richer gas the loss was not the same as with a poor gas, and the benefit was the greater the poorer the gas. He (Mr. MacPherson) also considered that Mr. Smith had not comprehended Mr. Hislop. As he understood the paper, there was the same pressure and the same quality of gas in both cases; but Mr. Hislop would be able to enlighten them on the matter. He thought they could see for themselves, with the naked eye, that the illumination afforded by the same quantity of gas arranged at one angle was superior to what it was when burning at another angle. Mr. Hislop deserved their thanks for the manner in which he had investigated the question of gas-burners; and nothing would tend more to give satisfaction to the consumers than a proper set of burners constructed on the principle advocated, suitable for all qualities of gas, from 18 up to 27 candles. A good idea was that the consumers should be supplied by the gas companies with burners specially adapted for the gas manufactured by them. In this way, not only would a benefit be conferred on the companies, but the advantage would be extended to their customers. If they were able to make 25-candle gas appear to be of 27-candle power, so much the better for the companies; and if they could develop a candle or two more for the same consumption, so much the greater saving for them. His opinion was that they should do all in their power to encourage Mr. Hislop.

Mr. Peebles asked Mr. Hislop if he had tried the effect upon the burners of very low pressure at these great angles. Would the low pressure not bring a corresponding type of flame, even although the angle of the burner was much greater than was illustrated at present?

Mr. J. West (Manchester), while acknowledging that the subject of burners was a very important one, said he did not set out to argue the point raised as to the angles, because it was one on which he had not experimented. He had, however, made a large number of tests with burners; and he thought there was a great deal in the question about low pressure. He made experiments a few years ago on every burner he could procure, and he read papers in Manchester on the burners actually in use in the city as compared with modern kinds. He found that, with the burners the consumers were using, the gas had an illuminating value about 30 per cent. less than it was capable of giving. He sent men out to collect burners in the city, and then compared them with the modern types. He gave the members this explanation to show them that the question before them was an important one. The conclusion he arrived at was that every burner should be governed. This was a question which gas manufacturers should take up, so as to show the people what burners they should have. They could do more in this way in pushing out the electric light than in any other. They should advise people to purchase the best burners; and if they did not follow this advice, let them have the burners for nothing.

Mr. Vass (Portobello) asked a question regarding the relation between the angle and the illuminating power of the burners. He said they had at present some testing appliances, but they were all very expensive. What was wanted was an instrument suitable for small works; and he thought the one before them might be utilized in that way.

Mr. W. Key (Tradeston, Glasgow) said the arrangement shown struck him as very well adapted for the purpose for which it was designed. The way Mr. Hislop directed the nozzles on to each other was one which must seem to them all to be very simple and effective. As to Mr. Vass's suggestion, he was afraid such a thing could not be. One thing had been mentioned by Mr. West, which was, he thought, at the root of the whole matter of the angles, and that was the velocity with which the gas approached the point of combustion, by having a tube wide enough instead of the old narrow burners. As an illustration, he mentioned Bray's "Special," where the tube was very wide, and they had a very slow, sluggish flame. This was what Mr. Hislop wanted, so as to have the best development of light they could get at the time. He considered Mr. Hislop had succeeded most admirably, and deserved their thanks for the admirable instrument he had designed.

Mr. J. Ballantyne (Rothesay) expressed the opinion that what was really wanted was a burner which consumers could regulate for themselves. He would like to know, however, if Mr. Hislop would give them some idea as to the cost of the burner. The drawback with consumers was that the cheaper the burner, the more demand there was for it; and if it was costly, the consumer would not have it. If Mr. Hislop's burner was cheap, they could induce consumers to purchase it.

Mr. W. Edwards (Renton) asked if an attachment could not be made to the burners, so as to regulate the flame; it seemed to be very unsteady and trying to the eyes. This was the reason for so many students and others using reading lamps.

Mr. Hislop, in reply, said he was very pleased his paper had elicited so much discussion. Mr. Peebles's experiment was one to indicate the difference between the original rat-tail burner and the union burner. The first form of burner made was only a jet just as straight as a pencil. A departure was made from this and a burner was invented called the "union jet," which made two jets into one at certain angles. At the same time, he (Mr. Hislop) thought it was a long way from showing how the angles could be altered so as to produce a flame of different dimensions. Mr. Peebles asked a question about tests with low pressures to get the same result. He (Mr. Hislop) believed it would be so. Then as to the question put by Mr. Smith, of Aberdeen, as to the same quantity of gas being burned under the same pressure, he explained that it was so. He might tell the members that the burner (tested before he left Paisley) was rated for 9·10ths pressure. He did not know the quality of Edinburgh gas, and had only assumed it was 27-candle power. It might have been very much higher than he had indicated. As to the cost of the burner, he was not at that moment prepared to say what it would be; because this was the first instrument that had been made, and it had been constructed very hurriedly. When it was ready for sending out, it would be supplied at the least possible cost.

The President said the thanks of the meeting were due to Mr. Hislop for the excellent paper he had brought before them. As Mr. Peebles had remarked, Mr. Hislop never submitted anything to the Association but what was of great use; and he was sure they all agreed with him that the present paper was of considerable service. It must have caused Mr. Hislop great trouble; and they could not do less than accord him a hearty vote of thanks for the admirable paper he had read.

Mr. Hislop, in response, said he wished to acknowledge his indebtedness to Messrs. James Milne and Sons for the assistance he had obtained from them in preparing the instrument.

Labour-Saving Appliances in Gas-Works.

Mr. John West (Manchester) then submitted a long paper on the above subject, copies of which, with drawings, had been distributed to the members. It was illustrated by a large number of diagrams on the wall, to which frequent reference was made. The author said that as his communication was rather too long for reading in full, he would pass over some portions of it; his chief object being to have a good discussion. It was followed by a long debate, in which Messrs. Smith (Aberdeen), Valon, MacPherson, Key, Terrace, and Hall (Montrose) took part. A full abstract of the paper, with a report of the remarks made thereon, will appear next week.

Visit to the Edinburgh Gas-Works.

The meeting then adjourned for luncheon, and during the interval most of the gentlemen present walked by the steep stairway known as Jacob's Ladder, to the Edinburgh Corporation Gas-Works. There they were cordially received by Mr. Kinloch Anderson, as Convener of a Sub-Committee who had been appointed to receive the Association, who was accompanied by other members. Mr. R. Mitchell, the Engineer, and Mr. Jack, S.S.C., the Clerk to the Edinburgh and Leith Gas Commissioners, were also in attendance to receive the company. When all had gathered in front of the governor-house door,

Mr. Kinloch Anderson said that on behalf of the Edinburgh and Leith Gas Commissioners he gave the Association a very hearty welcome to visit the works. They very much regretted that the Lord Provost was engaged on public business in London, and could not be there that day. He was Chairman of the Commissioners, and would have been very pleased if he had been able to be there to receive them. The Chairman of the Works Committee (Bailie Steel) was also in London. He trusted they would enjoy their meeting, and that their visit would be an interesting one. Being all practical men, they would know a great deal more than any of the Commissioners as to what they saw in the works. They could all look at them, and suggest anything which they thought would be an improvement. He was sure that all their employers, wherever they came from, must have been disappointed at the necessity of raising the price of gas. There had been a very general grumble in Edinburgh—first as to the reduction in the quality, and then as to the raising of the price; but both were inevitable. They, however, as Commissioners, were desirous of giving the consumers as good a

light as possible, and were determined also to keep the price as moderate as they could, both of which they hoped to be able to accomplish through the excellent management of their Engineer, Mr. Mitchell.

The PRESIDENT thanked the Councillors and Commissioners for the handsome way in which they had received the members. This was, he said, the first time the Association had met in Edinburgh since the Corporation had acquired the gas undertakings; and he thought it was a very fitting thing that the gas managers should visit them, and wish them all success in their work. He considered the time that this business changed hands had not been altogether a profitable one for the Commissioners. With the rise in the cost of coal, and the reduction in the price of residuals, together with the railway and other strikes, it had been a most unfortunate period. They looked forward to the day when coal would be reduced, and residuals would rise, and when there would be no more railway strikes; and they hoped that the business of the Edinburgh and Leith Gas Commissioners would go on prospering. He proposed a vote of thanks to the Commissioners for the kind reception they had given to the Association.

Refreshments were then served in the governor-room, after which the party were conducted over the works by Mr. Mitchell. The chief item of interest was the magnificent new bench of retorts, numbering 480, on the back-to-back system, which has been recently built. The retorts are Ω-shaped, 21 in. by 15 in., and 9 ft. long; and the bench is fired on an adaptation of the Siemens principle, in which the producers are placed at one side only. Each producer heats two of the ovens—the one against which it is placed, and the other on the opposite side of the bench. This method has been found to work very satisfactorily. The other recent improvements, such as the overhead railway, also came in for a good deal of attention; and the opinion was generally expressed that the works were in a very compact condition, well arranged, and in the best order.

AFTERNOON SITTING.

On resuming the business after luncheon,

The SECRETARY read a letter, dated from Dunoon, in which Mr. W. Mackenzie, of Dunfermline, expressed his regret that, on account of ill-health, he found it necessary to deny himself the pleasure of being present, but hoped the Association would have a truly successful meeting. A telegram from Mr. W. Foulis, of Glasgow, was also read, saying he was sorry he could not be with the members that day, and wishing them a pleasant meeting.

ELECTION OF OFFICE-BEARERS.

The SECRETARY next read the report of the Scrutineers on the ballot for the election of office-bearers, which showed the following result:

President—Adam MacPherson, Kirkcaldy.
Vice-Presidents—T. D. Hall, Montrose; W. Key, Tradeston, Glasgow.
Secretary and Treasurer—Robert S. Carlow, Arbroath.
Committee—Messrs. James M'Gilchrist, Dumbarton; Levi Monk, Maryhill; and Alexander Smith, Aberdeen.

PLACE OF NEXT MEETING.

The ballot was in favour of Dundee being the next place of meeting.

The PRESIDENT reminded the members that they proposed to unveil the Murdoch bust in the Wallace Monument next year; and he suggested that they should meet in Stirling, as being, on that account, a more suitable place.

As a number of gentlemen had not returned from their visit to the gas-works, the subject was left over till later. Subsequently, after a somewhat warm protest by Mr. John M'Crae, it was agreed that the meeting should be held in Dundee; the suggestion being thrown out that they could, on the second day, visit Stirling for the purpose of unveiling the bust.

THE REMAINING PAPERS.

Mr. G. LOVE (Paisley) read a paper on "Experience in the Construction and Working of Regenerative Retort-Settings," in which he described, with the aid of diagrams, the system of regenerative settings, with inside producers, which has been adopted in the Paisley Gas-Works, and which Mr. Hislop, the inventor, has introduced into a number of smaller works. The system was recommended by Mr. Love on account of its adaptability, by means of modifications, for settings of three, four, and up to eight retorts, which makes it suitable for adoption in small works.

The discussion on this paper—which will appear, *in extenso*, next week, together with the remainder of the proceedings now being briefly noticed—was opened by Mr. J. West, who was followed by Mr. T. D. Hall (Montrose), Mr. J. Hepworth, Mr. J. M'Crae, and Mr. A. Smith.

Mr. D. ROBERTSON (Dunoon) gave the next paper, on "Unaccounted-for Gas." He pointed out that, from statistics supplied by the West of Scotland Gas Managers' Association in 1875, the average eakage was 17·43 per cent.; while their Association last year reported a leakage of 12·78 per cent.—a reduction of 4·65 per cent. in 15 years. He had 13 per cent. of leakage. One cause of their high percentage was that they had 17 miles of mains to supply 13 million cubic feet of gas per annum; their distributing plant being fitted to serve a population of 20,000, three-fourths of whom resided for only three months a year in the district. They pierced the mains at places where they had reason to suspect loss of gas; and in this way they found a great number of bad leaks. They had since, from time to time, examined all their mains in a similar manner; and although it cost a good deal in wages for a month or two, at the end of the year it showed considerably on the right side of the balance-sheet. Mains and services were the chief causes of leakage. They found that, unless consumers' meters were regularly watered and looked to, they were not as they should be. For instance, a wet meter watered three times a year might be found failing to register for a month before each time, and thus one-fourth of the gas passing it in a year was lost to the company. Bad workmanship in services and mains was another source of leakage; and in this connection he condemned the employment of the "handy man" about a gas-works. Condensation was supposed by some to account for a large proportion of loss; but he was inclined to think that it affected the gas more adversely in quality than in quantity.

A short discussion took place on this paper.

Mr. D. MACFIE (Edinburgh) then read the last paper on the list; its title being "Regenerative Gas-Lamps, with Special Reference to the Lighting of Large Interiors." He said he was not there to discuss the relative merits of competing lamps, and therefore should confine his remarks to the system generally; wishing to approach the matter from a practical rather than a scientific aspect. The introduction of the regenerative system was one of the most important events in the history of gas lighting; and it was matter of surprise that its merits had not been more freely recognized. Without going into fractions or technicalities, it might be stated, as a general rule, that any ordinary regenerative lamp could be relied upon to increase by at least 150 per cent. the light from any given consumption of gas per hour. In practice, one might safely guarantee that equal light would be obtained with little more than one-third the consumption of flat-flame burners in the usual type of fitting; while, for a given consumption, it was equally safe to count upon almost treble duty from regenerative lamps as against ordinary burners. If the system trebled or only doubled the illuminating value of gas, it was alike the interest and duty of all concerned to recognize the fact, and make it known where such information would be serviceable. By the invention of the regenerative lamp, gas authorities had had put into their hands the strongest weapon of defence in face of the electric light crusade. In a fair fight, gas had nothing to fear; but in the public interest he took the liberty of suggesting that sellers of gas should make it plain that consumers are misled as to the relative cost of gas and electricity as illuminants. Electricians had been allowed to base their figures, not upon the best, but the least favourable methods of burning gas. Mr. Macfie showed that, consuming gas in ordinary burners, electricity costs 175 per cent. more than gas. In an exhaustive paper, he described the construction of regenerative lamps; pointing out impartially their weak as well as their strong points, but highly recommending their use on account of the greatly increased light they give, as well as the advantages that are derived from them in the improvement of ventilation and otherwise. In the end, he described several methods by which regenerative lamps have been successfully applied, both in the matter of lighting and in the saving of cost to the lighting of large buildings.

As the hour was late, it was proposed by Mr. M'Gilchrist that the discussion upon Mr. Macfie's paper should be held over till the next morning; and this was ultimately agreed to.

THE QUESTION-BOX.

This useful institution was largely taken advantage of at the meeting; the PRESIDENT reading the following four questions which had been placed in it:—

1.—Is it not advisable that this Association should recommend coalmasters to fit up small testing gas-works of their own, so that they might be able to send out practical working analyses instead of laboratory analyses, as they are misleading in purchases of coal for practical working in gas-works; and in the case of any dispute as regards quantity of gas per ton, or illuminating power, 1 cwt. of the coal could be selected from the heap and sent back to the colliery, and if deficient according to the purchase of the coal, the difference could be easily rectified with satisfaction both to the coal merchant and the gas company?

2.—Is a gas or a steam engine the most suitable motor for the exhauster in a small gas-works?

3.—What would you suggest as the best method for the prevention of rust on the side of purifier covers?

4.—What is understood by the use of dry lime instead of milk of lime in purifiers?

The reading of these questions brought the day's business to a close; and the members afterwards dined together.

FRIDAY'S MEETING.

The Friday morning meeting was easily disposed of. Only a few members attended—the hour (nine o'clock) being early.

On the motion of Mr. A. SMITH (Aberdeen), the four questions given above were remitted to the Committee to consider and answer.

The President's Medal was presented by Mr. D. TERRACE, of

Middlesbrough, in a neat speech, adorned with eloquence in prose and verse.

Mr. ROBERTSON having appropriately acknowledged the gift,

A vote of thanks was accorded to several Edinburgh firms who had exhibited appliances connected with their industry.

The PRESIDENT having intimated that Mr. Macfie had been called away to London, it was arranged that the discussion on is paper should be made the first business at next year's meeting.

A vote of thanks was then accorded to the Secretary for his services; and several other formal items of business having been transacted, the proceedings terminated.

THE EXCURSION.

The members subsequently drove to Roslin, by way of Dalkeith, where, through the courtesy of the Duke of Buccleuch, the conveyances were permitted to pass through the grounds of Dalkeith House, his Grace's principal residence. For this, which proved to be a very great treat, the visitors have to thank Mr. R. Mitchell, of Edinburgh; and it may be stated here that this was only one of many things which Mr. Mitchell did to make the meeting a success. On arrival at their destination, the party spent some time in exploring "Roslin's rocky glen," as sung of by Sir Walter Scott—a charmingly romantic dell, clothed at this season in Nature's most lavish garb of green. Opportunity was also afforded of visiting Roslin Chapel, the most ornate piece of ecclesiastical architecture in Scotland. Dinner was served in the village hall; and in the evening the party returned to Edinburgh. The weather was delightfully fine during the whole of the day; and this, with the beautiful and interesting sights which were placed before the party, made the excursion one of the happiest which has ever taken place under the auspices of the Association.

THE SUPPLY OF HYDRAULIC POWER IN SYDNEY.

A copy of the *Illustrated Sydney News* which has lately reached us, contains some interesting particulars as to the scheme of hydraulic power snpply carried out in that city by the Sydney and Suburban Hydraulic Power Company, Limited, of which Mr. John Coates, M. Inst. C. E. (of Messrs. Coates and Co., of London, Sydney, and Melbourne, who have established several gas-works in the colonies), is Chairman. We make the following extracts therefrom.

The Company was formed in December, 1888, with a capital of £150,000, in £1 shares. Of this, £70,000 is invested. After the various delays inevitable to the inception of a large undertaking, operations were commenced in October of the following year, when the first steps were taken towards laying down the plant; the position selected being near Darling Harbour. About 15 months were occupied in erecting the buildings and fitting up the plant; and early in the present year a start was made, and the machinery has since been running smoothly. The power-producing plant consists of three pairs of high-pressure pumping-engines; four Lancashire steel boilers, fitted with automatic stokers; two accumulators, with 20-inch rams and 22-feet stroke; and water-storeage tanks, with a capacity of 150,000 gallons. This plant is capable of delivering to the mains 1200 gallons per minute at a pressure of 700 lbs. per square inch. There are two pairs of engines, with 24-inch cylinders and 30-inch stroke; and one pair with 16-inch cylinders and 24-inch stroke. The boilers are each 25 ft. by 7 ft., with flues of 2 ft. 10 in. About 4½ miles of pressure mains have already been laid in the leading streets of the city; and numerous contracts for the supply of power have already been entered into. Up to the present, it has been applied chiefly to the working of warehouse and passenger lifts. The Company, of course, claim many advantages for their system, as compared with other sources of power, such as steam or gas engines; but the great point they make is a direct saving in working expenses, generally of from 15 to 75 per cent. It appears that a very important outlet for hydraulic power has been overlooked by the wharf-owners of Sydney—its utilization for the working of cranes, and other lifting appliances. The peculiar nature of this power is recognized at the docks of London, Liverpool, Hull, and, indeed, at all the largest shipping centres of the world; while, curiously enough, in Sydney, until recently, the only hydraulic cranes were those in use by the Gas Company. The power is supplied by meter, as in the case of gas. The works were designed by Messrs. J. Coates and Co., who were the Consulting Engineers of the Company up to the time of starting the works. Their construction was supervised by Mr. T. Dickinson, who was for many years with Sir W. G. Armstrong and Co., and who, as Resident Engineer, was also responsible for the erection of the machinery and the laying of the mains throughout the district.

American Natural Gas.—The Philadelphia Natural Gas Company, which supplies fuel to manufacturers at Pittsburgh, reports a net profit for last year of £229,600, and £600,000 of undivided profits. It is believed that natural gas can be had in paying quantities for at least six years to come; and that when the natural article gives out, the Company will supply, through existing plant, artificial gas for heating purposes.

REGISTER OF PATENTS.

Compressed Air or Gas Meter.—Abrahams, G. E., of Small Heath, Birmingham. No. 13,588; Aug. 29, 1890. [8d.]

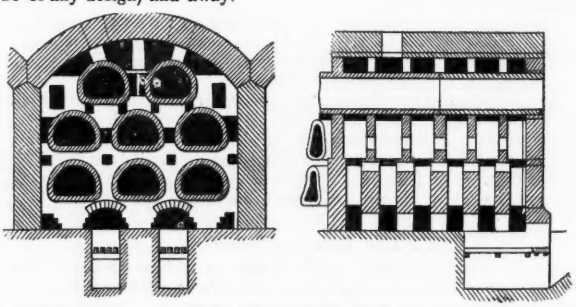
This invention refers to a meter specially adapted for measuring compressed air or other gas or vapour. It is constructed entirely or mainly of metal; the casing consisting of two parts—an outer part, which carries the inlet and outlet passages; and an inner casing, cast in one piece with the cover, and fitting accurately inside the outer part. The cover carries the mechanism for indicating in cubic feet the amount of air, gas, or liquid passing through the meter. The lower portion of the inner part of the casing is fitted with a light hollow cylinder, formed so as to leave an annular space for the air or gas to pass through; and this space is intersected by a number of thin fixed curved plates. Immediately above this is the rotating-wheel, which has on its periphery a series of thin blades curved in a direction opposite to that of the series of curved plates situated in the annular space above described. The rotating-wheel is fixed on a spindle, on the upper part of which is a worm communicating with the indicating mechanism; and on this spindle is also fixed a self-adjusting resistance governor for regulating the speed at which the wheel rotates.

The action of the parts is as follows: The compressed air or liquid on entering the meter ascends through the annular space within; being deflected obliquely by the thin fixed curved plates. The deflected current impinges upon the curved plates fixed on the periphery of the cylinder and carried by the spindle. Rotary motion is thereby communicated to the cylinder and spindle; and, through the worm at the top of the spindle, to the indicating mechanism. The worm gears with a worm-wheel; which transmits its rotary motion in the ordinary way. The rate of rotation of the cylinder and spindle corresponds with the quantity of air or gas passing through the meter, which quantity is indicated by the fingers traversing the dials of the indicating mechanism in the usual way; and that which has ascended into the upper part of the casing passes through openings into the annular space at the top and thence to the outlet-pipe.

When the quantity of compressed air or gas passing through the meter imparts to the spindle and the parts carried by it a high velocity, the momentum given to the spindle and parts may cause them to rotate for a time (on the sudden cutting off or diminution of the supply) at a higher velocity than is due to the amount passing through the meter; and in order to prevent this irregularity, and to make the meter indicate with approximate exactness, there is combined with the mechanism described an automatic resistance governor, consisting of two (or more) thin curved elastic plates, fixed to, and rotating with the spindle, so as to present their concave sides to the resisting compressed air or gas. At high velocities the plates open out, or their curvature becomes of greater radius; and hence they present a virtually larger surface to the resisting medium, and thereby check the tendency of the spindle and moving parts to overrun and indicate inaccurately.

Setting Clay Retorts.—Cooke, T., of Bristol. No. 17,745; Nov. 5, 1890. [6d.]

This invention consists either in setting eight retorts 18 to 20 feet long in one arch as a through setting, and heating them directly by four shallow furnaces, two placed beneath the retorts at each end of the arch; or else in setting eight retorts 9 to 10 feet long as a dead-end setting, and heating them directly by two furnaces similarly placed. In either case the retorts are set in three horizontal tiers one above another, with the furnaces placed below the setting, as shown in the engravings. The retorts are supported by brick piers or lumps, with apertures between them allowing a free circulation of the furnace gases, which after passing through the setting are carried through openings in the arch, regulated by dampers, into top flues (which may be of any design) and away.



The through setting is divided into two chambers by a division wall; and each chamber is fitted with supporting walls, as shown. The furnaces are built with fire-brick back and side linings; the furnace bars being of cast or wrought iron or steel, placed about 9 inches below the flame-bed in such a relative position to the setting as to cause the heat to radiate directly upon the whole exposed surface of the retorts at the same time, without down-draughts or bottom or side flues. For convenience in working these furnaces, a stoke pit is made the whole length of the bench, about 6 feet wide by 18 inches deep. This pit is fitted with a portable stage about 10 feet long, for use while the retorts are being drawn and charged. The floor of this stage is level with the floor-line of the retort-house. The stage is not shown, as it need not be of any special design; it may be an iron trolly on wheels or skids, or simply a platform or joist, or even loose plates.

Scoop for Discharging Gas-Retorts.—Keetman, T., and Bach, W., of Duisburg, Germany. No. 8068; May 11, 1891. [6d.]

This invention relates to a scoop or trough-like appliance for removing the coke from gas-retorts. The object of the invention is to effect a saving in hand-labour; to remove the coke in large pieces, and without the crumbling or crushing of it that occurs when hand

tools are used; and to prevent the inside surface of the retort from being injured in breaking away the coke therefrom.

Fig. 1.

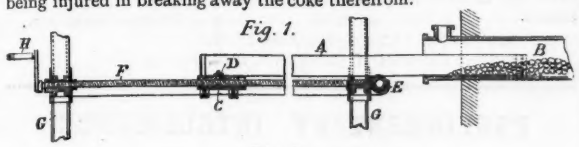


Fig. 2.

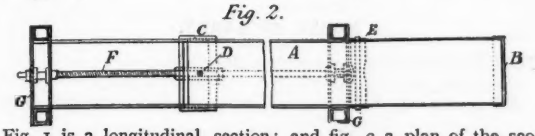


Fig. 1 is a longitudinal section; and fig. 2 a plan of the scoop mounted on a frame for moving it backwards and forwards.

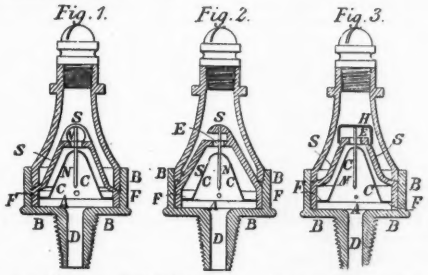
A is the scoop, of a cross section similar to that of the retorts with which it is to be used. Its front end is provided with a knife-edged rim B. Its back end is secured to a slide C by a pin or bolt D. Its forward part is supported on a roller E, on which it runs freely in either direction when the slide is worked along the rails or bed E, which may be accomplished by means of a screw-rod F carried in a frame G and by the crank-handle H worked through a corresponding screw-nut fixed to the underside of the slide C.

To discharge a retort, the scoop is slid into it, cutting with its front knife-edged rim B the coke clean away from the inside surface of the retort, and receiving its load at the same time. When loaded, it is withdrawn from the retort; and it may then be removed from the slide C, and carried away to be emptied.

Gas-Governors.—Peebles, D. Bruce, of Bonnington, Edinburgh. No. 8598; May 20, 1891. [6d.]

This invention relates to modifications of the well-known "needle" gas-governors, applicable to single burners, and a modification adapted for governing gas passing downwards through a pendant or other pipe to one or more burners.

Fig. 1. Fig. 2. Fig. 3.



Figs. 1, 2, and 3 are vertical sections of the several modifications.

In figs. 1 and 2, the needle N is fixed in the top of a shell S, of a conical form, and projects downwards within the shell to serve as a central guide for a light moveable hollow cone C, made with a thin horizontal flange F, which works freely, but fits as closely as may be without tightness, in a cylindrical space A, formed in the lower part of the same piece as the truncated conical shell S. This shell is fitted into a body casing B, in the bottom of which is the gas-inlet D under the cone C; and the gas finds its way through suitably proportioned small holes in the cone to the upper side of it. The gas passes from the upper side of the cone through a central aperture E, in the top of the shell; and the cone in rising or falling with variations of pressure acts as a valve to the aperture, and so regulates the flow of gas through it to the space outside of the shell, and thence to the burner. The shell is shaped as if made with a rounded apex from which opposite sides have been cut away. The modification shown in fig. 2 differs from that just described in the conical shell S having a slot cut partly across it near its apex, so as to form a communication between the valve aperture E and the outside of the shell; the apex remaining, to have the needle N fixed in it. In fig. 3 the needle N is fixed in a cap-like piece H, fitted on the truncated upper end of the conical shell S; the part of the shell receiving the piece being notched as shown to give egress to the gas passing through the valve aperture E.

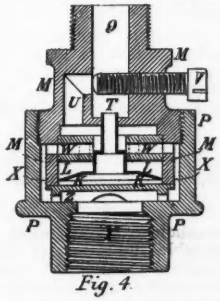


Fig. 4

Fig. 4 is intended for governing downwardly flowing gas. In it a flat or slightly convex disc K, provided with a central tube T, is substituted for the moveable cone C of the other modifications, and works in a cylindrical chamber L, formed in an upper body-piece M, which is screwed into a lower body casing P. The gas from the upper part of the supply-pipe has access down through a passage Q, in the upper part of the piece, and down through the central tube T, to the under side of the disc; and the part of the chamber L, above the disc is in communication through openings with the passage U, by which the gas passes from the inlet passage Q, through a port controlled by a regulating screw V. An enlargement on the central tube T, acts as a valve in a central opening in a piece W, fitted into the upper part of the chamber L, formed in the piece M; and the shoulder of the tube T, by its position, controls the flow of the gas from the passage U, through radial passages in the piece W, into a space X, surrounding the lower part of the piece M, and thence to the bottom downward continuation passage Y. The bottom of the chamber L is closed by a disc Z, the supporting rim of which is partly cut away to allow the gas to pass under the disc to the passage Y.

Water or Liquid Meters.—Justice, P. M.; communicated from the Thomson Meter Company, of Newark (N.J.), U.S.A. No. 8606; May 20, 1891. [11d.]

This invention, relating to the construction of disc water-meters, is not described by the patentee apart from the series of five sheets of drawings accompanying a very lengthy specification.

APPLICATIONS FOR LETTERS PATENT.

11,861.—Lanchester, F. W., "Improvements in gas-engine starting arrangements." July 13.

11,956.—Colville, D., "Improvements in and relating to jointing the ends of pipes, and couplings therefor." July 14.

12,066.—M'Naughton, J. A., "Improvements in apparatus applicable to engines worked by the vapour of oil mixed with air." July 16.

12,162.—Jeffreys, J., "Improvements in joints for cast-iron pipes." July 17.

12,256.—Stevenson, J., "Improvements relating to a method of transporting and delivering purifying material used in the manufacture of gas, and to apparatus therefor; such apparatus being applicable also for other purposes." July 18.

Manchester Corporation Water Supply.—Last Wednesday, a Select Committee of the House of Lords passed a Bill authorizing the Manchester Corporation to raise £550,000, of which the sum of £250,000 is for water-works purposes, repayable in respect of £100,000 in 40 years, and the remainder in 60 years.

Porto Rico Water-Works.—In May last a notice was issued by the Foreign Office respecting the sale of the contract for the construction of water-works for the supply of the town of Porto Rico. The Acting British Consul now reports that, no bidders having come forward, the Municipality have decided to open a competition for three months, dating from the 18th inst.

The Annual Dinner of the Employees of Messrs. D. Hulett and Co., Limited, of High Holborn, took place on Saturday, the 18th inst., at Markwells Royal Hotel, Brighton; the company numbering nearly 100. In the unavoidable absence, on the Continent, of Mr. W. Benson, the Chairman of the Company, Mr. C. H. Robins, one of the Directors, presided; being ably supported by Mr. J. H. Sheldrake and Mr. A. Ries, the remaining Directors. The toasts of the day—"Success to the Firm" and "The Chairman and Directors"—were enthusiastically received.

Shipley Gas Company.—The annual general meeting of this Company was held last Thursday, at the Company's offices, Shipley—Mr. G. Vint presiding. The Secretary (Mr. J. Wilcock) presented the accounts. The receipts from the sale of gas and residual products were £22,546; being an increase of about £2400 on the previous year. The expenditure was £15,797, which also was an increase; the chief item being £2700 as the cost of coal. The profit balance of £6748 was sufficient, after paying £204 as interest on mortgage bonds, for a dividend of 10 per cent. on the original stock and 7 per cent. on the new ordinary stock. The accounts were approved, and the dividends recommended were ordered to be paid.

Cost of the Public Lighting at Cardiff.—At a recent meeting of the Lighting and Electrical Committee of the Cardiff Corporation, the Borough Treasurer submitted a statement showing the cost of lighting the streets and public buildings in Cardiff. For the quarter ending December, 1890, it was 0·644d. in the pound for streets and public buildings, and 0·558d. for streets alone. For the quarter ending March, it was 0·653d. for public buildings and streets, and 0·568d. for streets alone. For the quarter ending June it was 0·624d. for streets and public buildings, and 0·570d. for streets alone. For the year ending December last the total for streets and buildings was 2·430d., and for streets 2·202d. For the year ending March it was 2·470d. for streets and public buildings; for streets alone, 2·225d. For the year ending June, it was 2·510d. for streets and public buildings, and 2·250d. for streets alone.

The Gas Supply of Swinton and Pendlebury.—A meeting of gas consumers, convened by the Swinton and Pendlebury Local Board, was held on Monday evening last week, at the Local Board Offices, Swinton, for the purpose of considering the advisability of promoting, in the ensuing session of Parliament, a Bill for obtaining power to supply the district with gas. It will be remembered that the out-districts served by the Salford Corporation recently secured the insertion of a clause in the Order applied for by the Corporation, giving them power, within a period of two years, to erect works and supply their own gas. Two members of the Board detailed the result of the agitation, which had extended over a period of two or three years, and strongly urged joint action with the Eccles Local Board in preference to the erection of separate gas-works for Eccles and for Swinton and Pendlebury. After a long discussion, it was decided to defer for future consideration the question of joint or independent action; but a resolution was passed instructing combined action to be taken with Eccles in promoting a Bill to obtain power to make and supply the districts with gas, and to purchase the interests of the Salford Corporation in the out-districts. A further resolution was passed giving full power to certain gentlemen to act on behalf of the Swinton Local Board in the promotion of the Bill. The Local Board afterwards held a special meeting, and unanimously agreed that Swinton should join Eccles in this movement.

CORRESPONDENCE.

[We are not responsible for opinions expressed by correspondents.]

The Enrichment of Coal Gas by Liquid Hydrocarbons.

Sir,—Had my reply to Mr. Valon's query not been a confirmation of past experience, I should not have written it; and I am quite content with the impressions conveyed to your readers, to whom (although the subject is in my opinion a most important one) I am afraid this correspondence is not very interesting.

As to the explanation I am desired to give—in reference to the fact of the South Metropolitan Gas Company having been fined two days in succession for low illuminating power—my reply is, that it may have been bad candles, stagnant gas, &c., or it may have been the fact (as stated in the evidence, page 78 of the JOURNAL, but not noticed in Mr. Valon's letter) that the gas was not tested at corresponding times. London engineers, who are working under Special Acts of Parliament, have to put up with many difficulties quite unknown to country managers; and the wonder is that they so seldom fail in carrying out the standards prescribed for them.

Referring to Dr. A. W. Williamson's report, on the quality of gas delivered, for the past three months, from over twenty London works (an abstract of which is contained in your issue of the 21st inst., p. 125), may I, as a practical engineer, ask Mr. Valon to explain how it is that the maximum and minimum quality were both highest (the average being equalled by only one other) at the Hornsey testing-station, where the gas was made about eight miles distant at the only manufacturing station of The Gaslight and Coke Company at present using our process—no cannel coal being used. Query, Is comment necessary?

Mr. Braidwood, the Engineer of the Greenwich works of the South Metropolitan Gas Company, informs me that the supposed difference in the illuminating power of the gas between the works and the testing-station, was the same when cannel coal was being used. He is also perfectly satisfied that the gas enriched by liquid hydrocarbons does not deteriorate by being stored in gasholders; and as our process has been continuously at work before and since the low tests were made, I take it that in this case, as in many others, the exception proves the rule.

Mr. Frank Livesey to-day informed me that he was so well satisfied with the working of our apparatus, cost of enriching, and the permanency of the gas enriched, that he has no intention of going back to the use of cannel coal.

FRANK W. CLARK, Engineer,
The Gas Lighting Improvement Company, Limited.

Suffolk House, Laurence Pountney Hill, E.C., July 27, 1891.

Mr. Methven's Report on the Leeswood Curley Cannel.

SIR,—I am not a gas engineer, and therefore cannot presume to criticize Mr. Methven's analysis of the new find of cannel at Pontybodkin, near Mold; but I observe that he remarks, as to the results given in your issue of the 21st inst., that they are such as to "indisputably place it at the *head* of the most valuable cannels raised in the kingdom." It is no doubt a valuable find; but, compare the analysis with that of Tyne Boghead, made by Mr. G. R. Hislop, of the Paisley Gas-Works, which shows 13,155 cubic feet of 38·22-candle gas, and the report of Mr. R. O. Paterson, of the Cheltenham Gas-Works, who says in his opinion "it is superior to the best Lesmahagow; indeed, it is the richest cannel at present raised in any quantity in Great Britain." He further goes on to say that, while he never quite obtained the quantity Mr. Hislop did, in quality he has exceeded him; having on several occasions obtained as high as 40 candles from the Tyne Boghead. I cannot reconcile with these reports Mr. Methven's statement as to the Leeswood Valley curley cannel being entitled to be placed at the "head" of the list of the most valuable cannels raised in the kingdom.

THOS. W. DANCE.

Newcastle-upon-Tyne, July 23, 1891.

Petroleum Storeage.

SIR,—In your last number I see an American invention described for storing petroleum in tanks made of wrought iron, and inserted in gasholder tank dumplings. How are these dumpling tanks to be got at for repairs? As from what I read it would appear that a free trade—water in and oil out, and *vice versâ*—is to be established between the two tanks, it naturally leads one to ask if one tank would not do. Recent experience has proved to me that the chief danger in petroleum storeage is during repairs; and a petroleum tank exploding inside a gasholder, even when the holder might be empty, would inevitably destroy both tank and holder.

I may also say that I have my doubts whether wrought iron is at all fitted for holding petroleum.

In regard to the larger question which has brought this about—viz., enriching gas by means of liquid hydrocarbons, you would, Sir, do immense good if you printed in the JOURNAL a concise account of the various attempts that have been made to convert liquid hydrocarbons into permanent gas since the year 1830.

THOMAS CANNING.

Newport (Mon), July 25, 1891.

Lighting by Distributed Petroleum.

SIR,—My attention has been drawn to the excellent description, in your issue of the 14th inst. (p. 64), of the system of petroleum lighting adopted by the Penn Lamp and Lighting Company, Limited; and as it concludes with an objection which has been made by inquirers elsewhere, I venture to reply that one of the leading fire insurance companies in London expressed their approval of the system, and gave their permission for its application to any ordinary building. I beg to suggest that the plan involves greater security from fire than the use of removable lamps, which are sometimes accidentally overturned; that pipes, charged with oil do not constitute a source of danger in themselves; and that, by means of an outlet at a low level, the whole of the oil in them can be withdrawn should the building be set on fire by other causes.

FREDERICK I. VAUGHAN.

The Penn Lamp and Lighting Company, Limited,
Abchurch Chambers, Abchurch Yard, E.C., July 23, 1891.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

The following progress was made with Bills last week:—

Opposition withdrawn: Keighley Corporation Bill.
Bill read a second time: Local Government Provisional Orders Bill, No. 14 [Salford Order].
Bill reported: Keighley Corporation Bill.
Bills read the third time and passed: Bognor Water Bill, Electric Lighting Provisional Orders Bill (No. 10).
Bills Royal Assented: Bristol Gas Bill; Clevedon Local Board Bill; Forfar Water Order Confirmation Bill; Gas Provisional Orders Confirmation Bill; Gas and Water Provisional Orders Confirmation Bill; Newark Corporation Bill; Northallerton Water Bill; Penmaenmawr Local Board Bill; Southwark and Vauxhall Water Bill; Stourbridge Improvement Commissioners' Bill; Water Provisional Orders Bill.

HOUSE OF COMMONS.

Thursday, July 23.

NEW STANDING ORDERS.

Mr. HASTINGS moved the following new Standing Order: "134B.—It shall be competent to the Referees on Private Bills to admit the petitioners, being the council of any administrative county or county borough, the whole or any part of which is alleged to be injuriously affected by a Bill, to be heard against such Bill if they think fit." He explained that the object of the Order was to place County Councils in relation to Private Bills in exactly the same position as was at present occupied by Town Councils and Local Boards. The Order was merely permissive, and would enable a County Council to obtain *locus standi* in the case of any Bill which affected the interests of the county.

Mr. COURTNEY said he did not intend to oppose the Order; but the House ought to understand exactly what would be effected by its adoption. It was true that it followed very much in the lines of the Standing Order which affected municipal councils. There was, however, a substantial difference to which attention ought to be called. Undoubtedly this Order, although it appeared to relate only to matters of procedure, did really amount to something which might be described as legislation. Early in the present session the question arose as to the right of county councils to appear in opposition to a Water Bill which affected the interests of the county, and the Court of Referees, after considerable argument, and not without some difference of opinion, came to the conclusion that the councils had no *locus standi*, which must depend upon a right, and a county council had no general right of supervision, control, and management of the water supply of the county. Therefore to admit *locus standi* would be to give these councils an authority which they did not at present possess.

Mr. C. S. PARKER, in supporting the new Order, pointed out that it would apply not only to Water Bills, but to other kinds of Bills also.

The motion was agreed to.

Mr. HASTINGS next moved the following new Standing Order: "134C.—The council of any administrative county alleging in their petition that such administrative county, or any part thereof, may be injuriously affected by the provisions of any Bill relating to the water supply of any town or district, whether situate within or without such county, shall be entitled to be heard against such Bill." The honourable member said he was aware that it differed in some degree from the existing Standing Order in regard to the rights of local boards; but he thought it did so rightly, inasmuch as the area of a county was much larger. A stream might have its source in one county and flow through another.

Mr. C. S. PARKER admitted that there was a great deal to be said in favour of putting county councils in the same position as municipal councils, as the former were the natural bodies to defend the interests of the counties as a whole.

The motion was carried.

THE LONDON COUNTY COUNCIL AND WATER SUPPLY.

Sir J. LUBBOCK asked whether Her Majesty's Government would give facilities to enable him to pass the London County Council (Water Supply, &c.) Bill in the form recommended by the Select Committee.

The CHANCELLOR of the EXCHEQUER: No, Sir. I understand that the Bill is highly contentious; and it would be contrary to our pledges to give such facilities.

The only progress to be recorded for the past week was in the case of the Alloa Water Bill, which was read the third time and passed.

Stockton and Middlesbrough Water Board.—Precepts for £39,538 are about to be issued on the Stockton and Middlesbrough Corporations and the South Stockton Local Board, payable in the usual proportions, for the purposes of the water undertaking. On account of not revenue of the Water Board, a sum of £18,000 will be divided among the three authorities in the same proportions.

Taunton Gas Company.—According to the report which the Directors of the Taunton Gas Company will present to the shareholders at their annual general meeting to-day, the quantity of gas sent out during the twelve months ending June 30 last was close upon 59 million cubic feet. The public and private lighting produced a net sum of £10,250. Dividends of 8 and 7 per cent. will be recommended; and after the payment of these, there will remain a balance of £1856.

MISCELLANEOUS NEWS.

THE LONDON COUNTY COUNCIL AND THE GAS AND WATER SUPPLY OF THE METROPOLIS.

We have been favoured by the Clerk of the London County Council (Mr. H. De la Hooke) with a copy of the annual report of the Council, embracing their proceedings during the year ending March 31 last. The following extracts indicate what the Council have done in connection with the gas and water supply of the Metropolis.

Taking gas supply first, this is dealt with in the report of the Sanitary and Special Purposes Committee. They set out at some length the conditions under which gas is sold in London, and give the prices now charged by the three Companies under the operation of the sliding scale—viz., The Gaslight and Coke Company, 2s. 9d. per 1000 cubic feet in their district north of the Thames, and 2s. 3d. in the southern portion; Commercial Gas Company, 2s. 4d. per 1000 cubic feet; and South Metropolitan Gas Company, 2s. 3d. per 1000 cubic feet. The Committee then remark: "It was expected that there would have been a material fall in the price of gas consequent on the abolition of the coal dues; but this has not proved to be the case, and the price of coal has, in fact, been during the past year considerably in excess of its price for some years previously. Notwithstanding this increase, the Companies have not raised the price of their gas, although we understand that the South Metropolitan Company are now paying a dividend below that which they are entitled to pay under the sliding scale." As to the quality of the gas, the Committee pointed out that the Companies are each required to supply it of an illuminating power which, when burned in a standard Argand burner at the rate of 5 cubic feet an hour, equals in intensity the light produced by 16 sperm candles, six to the pound, each of which burns 12 grains per hour. The gas is also required to be free from sulphur and other impurities to an extent determined from time to time by the Gas Referees appointed by the Board of Trade. The Council are required to provide Gas Examiners to make daily examinations of the gas of each Company at official testing-places prescribed by the Gas Referees, and provided and fitted by the Companies. There are at present 23 such testing-places provided in the administrative county of London, three of which are in the City, and under the control of the Corporation; the remaining 20 being under the Council. Twelve of these are for The Gaslight and Coke Company, six for the South Metropolitan Gas Company, and the remainder for the Commercial Gas Company. The Council's Examiners daily report the result of their testings; and these reports show that during the year ended March 31 last, the average illuminating power of the gas was as follows:—

	First Quarter.	Second Quarter.	Third Quarter.	Fourth Quarter.	Average for Year.
Gaslight and Coke Company—					
Cannel gas	21·1	20·6	21·0	21·4	21·0
Common gas	16·4	16·4	16·3	16·3	16·3
South Metropolitan Gas Company	16·3	16·4	16·3	16·2	16·3
Commercial Gas Company	16·4	16·4	16·2	16·1	16·3

The proceedings following reported deficiencies, and the penalties to which the Company are liable, are then specified. It appears that in the course of the year there were reported 39 cases of deficiency in the quality of gas. The whole of these reports were appealed against, with the result that in 11 cases the appeals were allowed, and in 18 cases disallowed. In the remaining 10 cases the decisions of the Chief Gas Examiner have not yet been given. The following is a summarized statement as to these irregularities—

	Cases of Deficient Illuminating Power.	Cases of Bad Quality.	Result of Appeals.
Gaslight and Coke Company	12	3	Four cases, appeal allowed; eleven cases, appeal disallowed.
South Metropolitan Company	12	3	Six cases, appeal allowed; six cases, appeal disallowed; three cases, appeal not decided.
Commercial Gas Company	8	1	One case, appeal allowed; one case, appeal disallowed; seven cases, appeal not decided.

There were five cases of proceedings before Magistrates; and penalties amounting to £105 11s., and £7 9s. costs, imposed. In two cases where the penalties were £100 and £2 respectively, the deficiencies occurred previous to the period covered by the report under notice. The Committee remark as follows on this matter: "In some respects the present Gas Acts are defective, and require amendment. In the first place, should a Company fail to carry out its statutory obligation to provide testing-places or testing apparatus, no penalty is provided for its disobedience, and some delays and difficulties of this nature have occurred. It has also been felt to be a defect that the Acts do not prescribe a standard for the photometers by means of which the illuminating power of the gas is tested; and the Companies have alleged that some want of uniformity in the testing proceeds from this cause. Another defect arises from the fact that the testings at the official testing-places are not altogether a guarantee that the consumer obtains gas of a sufficiently high illuminating power, as while the gas tested at the official testing-places may be above the standard, testings made in other parts of the district may show the gas to be considerably under that standard. Testings elsewhere than at the official testing-places have been made, by our direction, with a portable photometer, the use of which was suggested by the Gas Referees. Unfortunately, the testings made by means of this instrument have no statutory force; and although in a large number of instances such testings have shown serious deficiencies, no action against the Companies could be taken. But by far the most important point in which the present Gas Acts require amendment relates to the standard of light. As already pointed out, that standard now consists of the light produced by the burning of so many candles of a specified size and weight; and this standard is of such an uncertain and unscientific nature, and gives such varying results, that it is almost untrustworthy and unsatisfactory. As far back as the year 1881, a Photometric Committee, appointed by the Board of Trade, reported adversely on the existing standard, and suggested one which was trustworthy. Since that time experiments and observations made under the direction of the Royal Society, of the Metropolitan Board of Works, and of other bodies, have shown that the standard of light suggested by the Committee of 1881 was a satisfactory one. During the past year we have made strong representations to the Board of Trade as to the necessity of amending the Gas Acts in the directions above indicated, and at the request of that Department we have drafted clauses for the purpose. We regret, however, that up to the present time the Government have taken no practical step for giving effect to our suggestions.

With regard to the testing of gas-meters, which is a duty cast upon the Council by the Sale of Gas Acts, the Committee report that three gas-meter testing-stations have been provided in the county. These are each in charge of the Meter Inspector for the district in which the station is situated, who is assisted in his work by a considerable staff. Some difficulty has been experienced in consequence of the requirement of the Gas Acts that the work of testing shall be done by or under the immediate supervision of the inspector; while at the same time the Committee may be called upon to test at places other than the testing-station. To meet fully these requirements, it appeared to us to be necessary that there should be two Inspectors in connection with each station; and as an Inspector must have assigned to him a particular district, they have re-divided London into six districts, and have appointed three additional Inspectors. The fees for testing the meters are prescribed by the Acts; and the Committee report that this service is almost self-supporting. The number of meters stamped and the amount of fees received during the year were as follows:—

Station.	Meters Stamped.	Fees Received.
St. Anne Street, Westminster	32,910	£1234 0 6
White Lion Street, Spitalfields	24,982	898 13 0
Southwark Street, S.E.	26,608	981 9 6

During the year the Committee considerably enlarged and improved the Westminster station.

The proceedings of the Council in regard to water supply during the year covered by the report have been so recently chronicled in our columns that it is scarcely necessary to deal at any length with them. The Special Committee (of which the late Mr. J. Beal was Chairman) appointed to consider this matter state that a clause was inserted in the Council's General Powers Bill of last session, authorizing them to conduct inquiries and negotiations on the question of water supply at a cost not exceeding £5000. This Bill was subsequently passed; but, after mature consideration, the Council, for reasons which are fully specified, decided not to hold an independent inquiry. The Committee say the Water Companies did not appear to be disposed to give evidence at such an inquiry; and a Committee of the Corporation of London had, earlier in the year, taken evidence, although the Companies had declined to be present by their representatives or to give evidence. The Water Committee of the Council felt that an inquiry into so important a question as the water supply of London without the co-operation of the Water Companies must necessarily be one-sided and deficient. Moreover, several Bills relating to the question were in course of preparation, with a view to their being introduced into Parliament; and it was therefore thought preferable, under all the circumstances, to collect evidence bearing on the question, and place it before any Committee of Parliament that might be appointed to consider the Bills. They therefore proceeded to obtain evidence by means of special investigations made under their direction. They also instructed the Council's Engineer (Mr. A. R. Binnie, M. Inst. C.E.) to prepare a report on the subject. This report, which dealt mainly with the question of the sources of supply, was fully summarized in the JOURNAL for Feb. 3 last. The Committee also caused to be drawn up a synopsis of reports on, and evidence given before, Royal Commissions and Committees on the question of the water supply of London. With a view to expediting parliamentary inquiry, they recommended the Council to approach the Government; and a communication was accordingly addressed to Lord Salisbury requesting the Government to institute an investigation, so that a report might be made thereon in the course of the present session. Subsequently, six Bills affecting the water supply of London were introduced into the House of Commons—one of them being by the London Corporation, and one by the Vestries and other Local Authorities—and referred to a Hybrid Committee, whose proceedings, extending over some 23 days, have been fully reported in the JOURNAL. The Council decided to petition against certain of these Bills. The Parliamentary Committee of the Council submitted to them a report which dealt very fully with the Bills, and with the questions of policy raised by them. This report was before the Council on several occasions; and finally, on the 10th of March, its recommendations were adopted. The principal one was as follows: "That in the event of these Bills being referred to a Select Committee we should be instructed to intimate to the Committee on behalf of the Council, that this Council approves the principles indicated in this report, and is prepared to undertake the question of the water supply of London, subject to the following conditions: That powers should be conferred on this Council for the introduction into Parliament of Bills dealing with the water question, including the establishment of a new supply, and the improvement of the existing supplies, should further investigation prove such a course to be desirable, and that the Chairman of the Council be requested to introduce into Parliament a Public Bill with this object, with the view of its being referred to the same Committee as the several pending Water Bills." The Bill here referred to was introduced; but, as reported in our "Parliamentary Intelligence," it could not be proceeded with.

Electric Lighting at Huddersfield.—At the last meeting of the Huddersfield Town Council, it was resolved, on the recommendation of the Gas Committee to accept an amended tender submitted by the Brush Electrical Engineering Company, Limited, for carrying out an installation of electric lighting in the town at a cost of £20,640.

BIRMINGHAM CORPORATION GAS SUPPLY.

Gas Committee's Quarterly Report.

At the Meeting of the Birmingham City Council to-day, the Gas Committee will present their quarterly report on the affairs of the gas undertaking of the Corporation.

After mentioning that they have accepted certain tenders in connection with the extensions in progress at the Saltley and Windsor Street works, they state that the difficulties which were at first met with in adapting West's charging and drawing machinery to No. 3 retort-house at the Saltley works having been overcome, and the machinery having been in satisfactory operation throughout the past winter, they have authorized a further expenditure of £5475 10s. in the provision of the additional machinery required to complete the equipment of the house. They have accepted the tender of West's Gas Improvement Company, Limited, for other charging and drawing machines, for £2930 10s. The Committee have, on several occasions, had under their notice the desirability of reducing as far as possible, by the use of machinery, the heavy labour on coal and coke stacking; but until recently no design has been submitted to them which, in their opinion, would have warranted the expenditure required for its provision. Their attention has recently been directed to hydraulic cranes which have been devised for this purpose by Sir W. Armstrong, Mitchell, and Co., Limited. Finding that these cranes have been in successful operation at the gas-works of the Belfast Corporation, they have authorized an expenditure of £2810 on the construction of one crane and apparatus in connection with it, to be used for stacking coke at the canal arm adjoining No. 3 retort-house at Saltley, where the labour of coke wheeling is at present the most severe, and have accepted the tender of the above-named Company for the machinery, at a cost of £2054. The Committee do not anticipate any large annual saving by the employment of this plant; but they hope by its use to be able to dispense with the most arduous portion of the labour in connection with carbonization. Should this experimental trial confirm their anticipations, the Committee will in future extend it to other stacking sites.

Contracts have been made for the coal required in the coming year, at prices slightly lower than those of last year. The reduced rates are not, however, sufficient to bring the average price of coal for the year to the actual cost of last year, which included three months' working with coal at the lower figures prevailing before July, 1890.

A communication has been received from the Corporation of Sutton Coldfield, inquiring whether, in the event of their purchasing the works of the Sutton Coldfield Gas Company, the Corporation of Birmingham will also sell to them the supply afforded in that parish from the Birmingham works. The Committee have informed the Sutton Coldfield Corporation that, in the event of their seeking parliamentary powers to supply gas within their district, the Corporation of Birmingham would not offer any opposition to the proposal, provided that a clause is inserted in the Bill for the purchase by agreement, or, failing agreement, by arbitration, of the rights of the Corporation as regards the supply of gas to Sutton Coldfield.

The course of lectures on cooking by gas referred to in the last report of the Committee have been given at Harborne and Erdington, with very satisfactory results. In addition to the cooking-stoves which have been issued to consumers in connection with these lectures, heating-stoves and improved gas-burners exhibited at the lectures have been sold. The experience gained by this experiment has, the Committee say, clearly shown the importance of taking special measures from time to time for bringing before the notice of consumers modern forms of gas apparatus.

The Committee will submit to the Council amended regulations relating to the superannuation funds of the employees of the departments; and they report that, having regard to the evidence obtained by, and the conclusions of, the General Purposes Committee, they have abandoned the suggested establishment of a superannuation fund for the workmen of the Gas Department.

BRADFORD CORPORATION GAS AND ELECTRICITY SUPPLY.

Coal Contracts—Extensions at the Birkshall Works—Addition to the Electric Lighting Plant.

At the Meeting of the County Borough Council of Bradford last Tuesday week—the Mayor (Mr. E. W. Hammond) presiding—the Gas and Electricity Supply Committee recommended the acceptance of various contracts for the supply of cannel and gas coal, and a tender for the erection of a retort-house (exclusive of roofing) at the Birkshall gas works, for the sum of £4390.

Alderman F. Priestman, in moving the adoption of the minutes said that although both items of expenditure had been previously before the Council, and had been sanctioned, he thought it only right he should offer a few remarks as to why the Committee had brought forward the matter now. As regarded the coal tenders, the contracts which had been accepted showed from 6d. to 1s. per ton reduction upon the price paid a year ago; and this fact justified the policy which the Committee recommended to the Council last year, and which had been adopted—namely, of purchasing 60,000 tons instead of 160,000 tons required for the year's consumption. A similar policy had been pursued this year. It was satisfactory to find that the consumption of gas was steadily increasing, despite the fact that trade was affected by hostile tariffs and other causes; and the supply was now not equal to the demand. In December, 1888, there were consumed 192 million cubic feet; in December, 1889, 205 millions; and in December, 1890, 217 millions. It was absolutely necessary that the gas-works should be increased at the present time, and that the new retort-house should be pushed on with at once. It was proposed only to put down retorts as they were required. But in two or three years, with an expenditure which, he expected, would amount to £55,000, they would have the power of producing 3 million cubic feet of gas per day; whilst up to the present time, with an expenditure of £154,000, the make was 2,250,000 cubic feet. With regard to a question affecting the electric lighting works, the present works had cost £35,000; and he was going to ask for £5000 or £6000 for increasing them. It was proposed to put down one 300-horse power engine, and two 80-horse power engines. The works now were able to supply 3500 ampères; and with this addition would produce 1800 more. The proposal to light the Town Hall was before the Council, and would probably soon be carried out; and the Committee had a large number of demands for electric lighting current. They had not pressed the matter, for they had the interests of the gas-works—in which a large amount of capital had been sunk—to preserve; but the increased demand was consequent upon the superiority of the electric light. He apprehended that the Council would wish that the Committee should keep pace with these demands. The two smaller engines were required to obviate the necessity of running the larger engine in the morning, when the demand was at its minimum. By this means, the very uneconomical proceeding of running a large engine at a low power was rendered unnecessary.

Mr. Kay seconded the motion.

Mr. Galloway thought that Alderman Priestman ought not to have used the word "economy" in his remarks, because the electric light had been a source of loss to the Corporation. No member of the Corporation would continue a losing business of his own; but when they were dealing with public money, an undertaking would be pressed forward whether it was a losing one or not, if it pleased the fancy of some people. If the supply of the electric light was a paying concern, he would support Alderman Priestman; but he could not do so at the present time.

Alderman Smith Feather appealed to Alderman Priestman to postpone the proposed addition of the two small engines to the existing plant at the electric light works. An enormous expense had already been incurred there. He understood that they were at present consuming 6 lbs. of coal per hour for each horse power indicated; and he had been informed that the consumption could be reduced to 1½ lbs. per hour. He was further given to understand that a proposal had been made to the Halifax Corporation to supply a complete electric plant, and guarantee a profit of 7½ per cent.; and if this could be done at Halifax, it could be done in Bradford.

Alderman Priestman, in reply to Mr. Galloway, said he considered the expenditure on the electric light works was a wise one. He would not propose any expenditure of public money unless he believed it would be a wise expenditure. Up to Dec. 31, 1889, the loss on the works was £1079; during the half year ended the 30th of June, 1890, it was £732; and from that date to Dec. 30, 1890, it was £315. This showed clearly that they were now on the verge of making the works pay; and from the facts and figures he had given to the Council, he had not the slightest hesitation in saying that, by the end of next year, the works would be paying more than the interest on the money expended on them. He was sorry that he could not accede to Alderman Feather's request, as he believed it would be a very serious blunder to do so. Alderman Feather's statement as to the consumption of coal was not correct. The quantity of coal consumed depended, of course, on the quality used; and instead of the consumption, reaching 6 lbs. per hour, it was more likely to be about 2¼ to 2¾ lbs. per hour. At certain periods of the day, when only a light load was upon the engines, the consumption might be 6 lbs. per hour per horse power; and that was the reason why he was asking for two small engines. He appealed to the Council to complete the installation in the way proposed by the Committee. He believed it would very soon be the duty of someone to ask the Council to spend an additional sum of money on the electric light works, and that would be the best time to deal with the question raised by Alderman Feather. He thought the Committee were proceeding in the most economical way possible. There had been a complaint in some quarters about not adopting the alternating current; and in answer to that, he wished to state that the direct and continuous current was the one most favoured by authorities on the subject, and was the one which would probably be generally adopted in the future.

The motion was carried.

THE DUBLIN CORPORATION AND THE GAS COMPANY.

The Recent Action for Slander against a Town Councillor.

At the Meeting of the Dublin Town Council, on Monday last week—the Lord Mayor (the Right Hon. J. M. Meade, J.P.) in the chair—the proceedings recently taken by the Alliance and Dublin Gas Company against Mr. T. Mayne, a member of the Council, to recover damages for alleged slander, as reported in the Journal for the 16th ult. (p. 1194), were under discussion, on a report on the subject presented by a Committee of the whole house.

The Lord Mayor, in moving the adoption of the report, remarked that the members of the Council were all aware that the action was instituted by the Gas Company against Mr. Mayne in consequence of his expressions of opinion as to the dealings of the Company and the Corporation in the matter of the public lighting. The result was a verdict against the Company, who had to pay the costs.

Mr. Sherlock seconded the motion.

Alderman Perry, in supporting the motion, expressed the opinion that the conduct of the Sub-Committee who had for three and a half years been dealing with the gas question had been entirely exonerated; and that the case would be regarded as one to be followed. The Committee had not finished their work, as they would yet have to consider why so high a price was paid for gas in Dublin.

Alderman Dillon said he agreed with Alderman Perry in considering that the Corporation had scored a victory in this case; but he would ask him and the Council not to forget that they were still dealing with the Company, and that, notwithstanding any faults there might be, they should endeavour to avoid friction with them. He was not aware of any serious dispute now existing with the Company; matters between them and the Corporation were now going on pretty smoothly. He

hoped they would continue to do so, and that members would not take too much to heart the observations made by Alderman Perry.

The HIGH SHERIFF said he would not have taken any part in the discussion if it had not been for certain accusations made against him in the course of the trial. Counsel for Mr. Mayne stated that he (the High Sheriff) came to the Council on the 2nd of February last primed by the Company, or by their Secretary, with charges against the Gas Committee; and that he utilized his position as a member of the Corporation corruptly in the interests of the Company. He regarded that as an abominable accusation; and if it were true, the Council ought to expel him. It was an unmanly and cowardly charge to make against him under circumstances which shielded the person who uttered it and the persons who concocted and supplied it. He hoped the result of the case would be not only that there should be free and unfettered discussion in the Council, but also that there should be honest and impartial discussion. He was entirely satisfied with the truth and *bona fides* of Mr. Mayne when he said he believed the statements were true when he made them. But Mr. Mayne had pleaded privilege as his defence to the action. He (the High Sheriff) entirely acquitted Mr. Mayne of having made any statement which he believed to be false; he thought he was incapable of that. But if privilege was to be pleaded, members of that and other public bodies ought to remember that they should take the trouble to sift carefully beforehand the truth of any statements they made. Otherwise, in the words of the Judge at the trial, privilege might be misused for purposes of spite and malice. But it struck him (the High Sheriff), from the report of the trial, that Mr. Mayne was not only misinformed but badly informed, on the occasion of his speech. He admitted in his evidence that when the Gas Committee went into Court a year and a half ago he was personally ignorant of a vital matter—viz., the existence of a report by Mr. Strachan, an expert, who advised the Committee that they had not a leg to stand on. The best defence that could be made for any public statement alleged to be injurious was not privilege, but that it was justified by facts. But both Mr. Mayne and his Counsel were badly informed. If Mr. Mayne had been in a position to justify the truth of the charges made, no doubt he would have done so. The Judge informed the jury that they were bound to assume that there was no foundation for the statements.

Mr. MILEY said the question really arising on the report was whether a member of the Council should be taken before a Judge and compelled to prove the truth of certain charges. He (Mr. Miley) did not care whether the charges were true or not; he contended that that was not the place to take a member of the Council. The only tribunal that would have a right to call on a member of the Council for a defence of his statements was the Council itself or the ratepayers.

Mr. MAYNE said the speech of the High Sheriff was a very peculiar one. The first part of it was apologetic and explanatory; while the second part was a lecture to members of the Council, present and future, recommending them to see that the statements they made were true. He (Mr. Mayne) had called on the High Sheriff to say in what particular the statement he (Mr. Mayne) made was untrue; but he could not point to a single statement or charge as being inaccurate. The High Sheriff only made a sort of general statement to the effect that, because privilege was pleaded on his behalf as a member of the Council, he could not, therefore, establish the truth of what he said. He had afforded him an opportunity of giving chapter and verse for whatever was in his mind on the subject; but he had declined to furnish the Council with the particulars on which he based his insinuation. Therefore, he (Mr. Mayne), for one, would place no value on any statement he might make in future. As to the plea of privilege, he did not adopt it, nor did any member of the Gas Committee. They would have much preferred to meet the case on its merits. But when he found himself in law, he placed his case in the hands of competent men, and they decided on the course to be adopted. It was stated by some one that the occasion was the first in England, Ireland, or Scotland in which an attempt had been made to muzzle a member of a municipal corporation or local body, and that, therefore, the duty was cast on the Council of fighting the question as one of privilege, and of making a precedent that might be referred to in future cases of attacks on members of corporations. This was why the plea of privilege was adopted as a defence. He did not want to shelter himself behind privilege there or anywhere else. He was not aware that he had made any mistake whatever in connection with the gas question at any time; and he submitted that no interest could be served by the position the High Sheriff took up, or by the speeches he made.

The HIGH SHERIFF said that in his speech in February last he criticized the action of the Committee, and not that of Mr. Mayne; and, therefore, he owed him no apology. On the contrary, Mr. Mayne owed him (the High Sheriff) an apology for the scandalous statements made concerning him in the action—statements which were based on no evidence, and which must have been supplied by the parties to the defence.

The LORD MAYOR said he thought this unpleasant matter had gone quite far enough.

The report was then adopted.

Cleveland Water Company.—The Directors' report and statemen of accounts for the half year ending June 30 last, to be presented at the 46th half-yearly general meeting on the 11th prox. have been issued to the shareholders. They show that after providing for interest, rents, and other preferential charges, the balance remaining is £2447 9s., from which the Directors recommend the payment of a dividend at the rate of 6 per cent. per annum on the original and "A" shares, and £4 4s. per cent. on the "B" shares, free of income-tax. This will absorb £1872, and leave a balance of £575 9s. to be carried forward. Comparison between the accounts for this half year and the corresponding period of last year shows an increase of about £117 in the receipts from waterrents; but the net balance brought forward from the previous half year being £133 less, and repairs rather heavier, the disposable balance is reduced to £27 less than in 1890, when dividends at the same rates were declared. An Auditor will have to be elected in the place of the late Mr. Rod. Mackay, Secretary of the Cagliari Gas and Water Company, whose death in February last, at Monte Carlo, was noticed in our columns at the time.

PARA GAS COMPANY, LIMITED.

The Directors of this Company have issued their report on the affairs of the undertaking for the six months ending March 31 last, accompanied by the accounts for this period. They state that the net profit compares favourably with that of the two preceding half years; there being a decided improvement in the revenue from private lighting, coke, illuminations, and gas-fitting. The expenditure has slightly increased, but very slightly as compared with the increased revenue. A general meeting of the shareholders was held on the 19th of February last, when a dividend was declared at the rate of 2 per cent. on the ordinary shares for the year ending Sept. 30, 1890; and this dividend has been duly paid. During the period now under review, it is estimated that, owing to delay in payments by the Government, the loss in exchange and interest has amounted to about £640. There is reason to believe, however, that the matter of loss in exchange, and the long outstanding claims for repayment of import duty on coal, are being examined by the Government. The Directors much regret that Mr. J. G. Newbigging is still advised that the state of his health will not yet warrant his return to Pará; and they have therefore reluctantly accepted his resignation, and have appointed Mr. Cocks as Manager in his place. As the concession under which the Company are now working terminates in October, 1892, it has been deemed desirable, in accordance with the expressed wish of the shareholders, that one of the Directors should proceed to Pará to make arrangements as to the future of the Company. Mr. Rumball, M. Inst. C. E., has been selected for this mission and is now in Pará. In accordance with the power vested in them, the Directors propose to pay the usual dividend on the preference shares on or about the 1st prox.; but, after full consideration of the position of the Company's contract, and the uncertainty as to the future, they do not feel justified in declaring an interim dividend on the ordinary shares. The outstanding debentures issued by the Company, amounting to £7200, were retired at maturity on the 30th of June last; and the property of the undertaking is thus freed from all encumbrance.

METROPOLIS WATER SUPPLY.

The Quality of the Water in June.

The returns furnished to the Registrar-General by the London Water Companies as to the water supply of the Metropolis during the past month show that the average daily supply was 190,514,651 gallons, as compared with 185,376,080 gallons in the corresponding month of 1890; being at the rate of 31·5 gallons per head of the population. Of the entire bulk of the water sent out, 96,594,616 gallons were drawn from the Thames, and 93,920,035 gallons from the Lea and other sources. Reporting upon the quality of the supply, Dr. E. Frankland said: "Taking the average amount of organic impurity contained in a given volume of the Kent Company's water during the nine years ending December, 1876, as unity, the proportional amount contained in an equal volume of water supplied by each of the Metropolitan Water Companies and by the Tottenham Local Board of Health was: Kent, 0·9; Colne Valley, 1·3; Tottenham, 1·5; New River, 1·7; East London (deep-well), 2·3; East London (river supply), 3·4; Chelsea, 3·5; Grand Junction and Lambeth, 3·6; West Middlesex, 3·8; and Southwark, 4·5. The water abstracted from the Thames by the Chelsea, West Middlesex, Southwark, Grand Junction, and Lambeth Companies contained markedly more organic matter last month than in May; and the organic matter was more highly nitrogenous. The Southwark Company's water was especially conspicuous in this respect. All these Companies delivered efficiently filtered water. The water taken chiefly from the Lea by the New River Company ranked, in respect of organic purity, with the deep-well waters. That delivered by the East London Company from the same source was of slightly superior quality to the best of the Thames-derived waters. Both supplies were efficiently filtered before delivery. The deep-well waters of the Kent, Colne Valley, and East London Companies, and of the Tottenham Local Board of Health, were all of good quality for dietetic use; and the Colne Valley Company's water, having been softened before delivery, was rendered suitable for washing. All these waters were clear and bright without filtration. Seen through a stratum 2 feet deep, the Kent, Colne Valley, and Tottenham waters were clear and colourless; the New River, clear and nearly colourless, and the remaining waters, clear and very pale yellow. The bacteriological examination by Dr. Koch's process of gelatine plate culture gave the following results: One cubic centimetre of each water collected in sterilized vacuous tubes, on the same days as the samples for chemical analysis, developed the following numbers of colonies of microbes; West Middlesex, 36; Lambeth, 494; and New River, 16."

Messrs. Crookes, Odling, and Tidy, in their report for the past month on the composition and quality of samples taken daily of the water supplied to London, say: Of the 182 samples examined, the whole were found to be clear, bright, and efficiently filtered. The water supplied to the Metropolis during the month of June, though not exhibiting that extreme degree of freedom from organic matter—present in small proportion in potable waters generally—which characterized the supply for the previous month, maintained, however, the satisfactory character which the Metropolitan water has now presented continuously since the period immediately following on the breaking up of the severe and exceedingly prolonged frost of last winter; the exceptional results afforded at that period being made a subject for comment in our report for the month of February. During the past six months, we have examined 1008 samples of the water distributed to the Metropolis by the Companies drawing their supplies from the Thames and the Lea. The generally excellent quality of the water is shown in the abstract set forth in the following table, of the results afforded by the Thames-derived supply during each of the

consecutive six months respectively; the results afforded by the entire supply furnishing even yet lower figures:—

	Ratio of Brown to Blue Tint. Means.	Oxygen required for Oxidation. Means.	Organic Carbon per 100000 Parts. Means.	Organic Carbon per 100,000 Parts. Maxima.
January	—	0·004	0·142	0·165
February	—	0·081	0·263	0·489
March	14·1 : 20	0·049	0·146	0·209
April	13·9 : 20	0·055	0·155	0·190
May	9·6 : 20	0·042	0·136	0·150
June	14·4 : 20	0·060	0·153	0·181

NOTES FROM SCOTLAND.

From our Edinburgh Correspondent.

EDINBURGH, *Saturday*.

On gas matters, there is little to say this week. My last "Notes" seem to have exhausted all there is to be recorded for some time to come; most of the bodies with which I have to deal having recently started clean sheets, upon which there are as yet scarcely any results that will bear comment.

The principal item of news in this district is, of course, the very large one of the meeting of the North British Association of Gas Managers—a matter which is too extensive to be dealt with in my "Notes," and which you will have in full in other columns. I may just say that locally there is gratification that the meeting was such a happy one, both in its instructive and its pleasurable aspects. It is to myself personally a matter of gratification that the Edinburgh and Leith Gas Commissioners behaved so handsomely to the members of the Association. There was a good deal to be seen in the Edinburgh Gas-Works which they did not see on the occasion of their last visit in 1886; and what there was the members were made welcome to look at. It is a pity there was not a larger attendance of the Commissioners at the visit; because, in a walk round with a body of practical men, they would probably have learned more as to the "ins and outs" of gas manufacture than their visitors could have learned from an inspection of the plant. The Commissioners might also, with great profit, have attended the meeting of the Association. If it is said that this could not be permitted, I feel inclined to reply that, when coal merchants and other traders are made welcome as members, I see no good reason why gas commissioners or gas-works directors, who deal with these traders, should not also be members. If the doors of the Association are to be opened to any except those who are engaged in the technical departments of the gas industry, it is surely reasonable that all who are directly connected therewith should be admitted.

The Aberdeen Corporation last year obtained—that is to say, they were compelled in self-protection to seek from Parliament, and were granted—a Provisional Order empowering them to supply electricity for lighting, and I presume power purposes, within a certain circumscribed area in the city. The question which is now forced upon them is what they are to do with it. Their own researches, as I pointed out in the JOURNAL for the 24th of March last, elicited the fact that out of users of gas representing a rental of £4000 a year, consumers of only £100 of gas declared their willingness to take the electric light. This plainly represented too small a revenue upon which to erect electric lighting plant, which, as they were advised, would require an annual revenue of £5875 to make profitable; and so the Corporation in April last resolved to ask if anyone else was prepared to take the risk of supplying the light. At that time (as will be seen by my "Notes" on April 7) I wrote: "It remains to be seen whether any of the numerous inchoate bodies who have for the past two years been dogging corporations all over the country, will be as eager to incur loss themselves as they have been to thrust it on the communities they have been so mercilessly tormenting." It is interesting to observe how completely the expectation mirrored in the above sentiment has been verified. Only two offers were received; being exactly half the number of notices that were originally served on the Corporation by electric lighting companies who were thirsting for the opportunity of—well, getting a footing in the city. One of these is by the Brush Company; and the other by Mr. R. Miller, of Glasgow. Very curious it is to read these offers in the light of the tall remarks one constantly hears from the promoters of electric lighting; for both reveal the weakness of the case for that system of illumination. Mr. Miller, for instance, frankly confesses that "there is not scope enough in the area to make a central electric lighting station pay;" and he makes the proposition that if the Corporation will assign to him their powers under the Provisional Order, "he is willing to try to start a local company to take them over, and to fit up a proper station with the newest Thompson-Houston alternating plant," and that "an arrangement could be made for either the Town Council participating in the profits after a fixed cumulative dividend and reserve fund had been earned, or a reduction in the rate charged to consumers being made, as might be mutually agreed on." Upon this offer one is tempted to ask, What is the difference between a central lighting station and a "proper" station, which would make the one profitable and the other not? The Brush Company's offer is a long one. The effect of it, however, is that a local company should be formed to take over the powers under the Provisional Order; and that the transfer should be for 21 years, at the end of which time the Corporation would have power to acquire the undertaking upon payment for it as a going concern, including goodwill at a valuation, and repayment of a cumulative dividend of 10 per cent. per annum, less dividend paid. Various other conditions are introduced, such as that they recommend the system adopted to be an alternating current one, and that the Corporation must agree "not to reduce the price of gas during the term of the agreement to such an extent as to seriously interfere with the business and goodwill of the company undertaking to supply the electric light." Both of these offers would lead to the result that the Corporation, having obtained a Provisional Order, should place themselves outside of it. That of the Brush Company (I suppose in obedience to the terms of the advertisement requesting offers) virtually proposes conditions which would have been obtained under the Electric Lighting Act of 1888—viz., a period of 21 years, and payment for goodwill. It is singular, after the outcry which the electric lighting companies made against the Act of 1888, to find one of the leading companies making an offer which would be, in effect, a return to it. Does it mean that the objections to the Act were a mere pretence to excuse the non-success of the electric lighting movement? or that the Company are now professing to be able to do what is impossible? The coolness of Mr. Miller's offer lies in the assumption that where the Corporation could not make electric lighting pay, a company could make profits in which the Corporation might participate; and it flies in the face of at least the spirit of the Act of 1888, by virtually proposing that the Corporation are to be partners with the proposed local company in the maintenance of the undertaking. It is in this connection that the "cloven foot" appears in both offers; for it is to be observed that neither of the offerers are willing to undertake the supply of electricity themselves. What they propose is, in effect, that they should have the profit to be made upon the work of fitting up the installation, but that the local company should "hold the baby." I am very much mistaken if the Aberdeen Corporation are not too shrewd to enter into any such agreements. They have another proposal before them, by Mr. W. B. Esson, of London, who is, in a sense, their adviser in the matter, and the effect of which is that they should themselves supply the light. Mr. Esson's advise is not very much better than that of the two outside offerers; for whereas the original report under his direction provided dynamos for 2000 16-candle lamps, at a cost of £21,300, he has now cut down his recommendation to an installation of 1000 lamps at a cost of £8450. Which of the two estimates is the correct one? may well be asked. It is apparent that either the Corporation or Mr. Esson are very much at sea on the subject. Whichever of them it is does not matter. The truth, undisguised, is that the Aberdeen Corporation are confronted with a difficulty which it will tax their ingenuity to surmount, and that no help will, or can, be given to them to overcome it in the quarter to which they have turned for help. What their next step will be, they must themselves determine; and it does not require much foresight to perceive the probability of their allowing the Provisional Order to lapse.

I mentioned last week the unfortunate difference which has arisen between the Falkirk and Larbert Water Trustees and the contractors for the construction of the new water-works. This week an incident of a painful nature occurred which is not calculated to improve the situation. The decision of the Trustees to employ Mr. Reid, C.E., of Edinburgh, to inspect the works before they are taken over from the contractors, seems to have—and very naturally, too—led their Engineer (Mr. Copland, C.E., of Glasgow) to look upon the Trustees' action as pointing suspiciously to an attempt to get up evidence which might be used against him in the witness-box. Accordingly, on Wednesday last, when, in obedience to a request by the Trustees that he should again inspect particularly the embankment of the Earl's Burn reservoir, Mr. Copland attended for that purpose, he took with him Mr. Barr, C.E., of Glasgow, presumably with the intention that, should litigation arise, Mr. Barr might be able to give evidence. This gentleman was refused admission to the works; and as Mr. Copland would not proceed with his inspection without his friend, none was made. Since then Mr. Copland has written to the Trustees, saying that their action must be assumed to mean that they have taken over the works. It looks very much as if the Trustees were drifting into the Law Courts; and if they do eventually find themselves there, I cannot see how they can put the blame on anyone but themselves.

From our Glasgow Correspondent.

GLASGOW, *Saturday*.

At the last meeting of the Town Council of Oban, the question of the acquisition of the works of the local Gas Company was under consideration, as on one or two former occasions. The subject was raised by a letter (held over from the preceding meeting) from Mr. D. MacGregor, Solicitor, which stated that the Gas Company were willing to hand over the works to the town in one of two ways—either according to valuation, as provided by statute (the arbiters to be appointed by the Sheriff of the County), or at the mean average of the prices paid by corporations in Scotland for gas-works. It was also stated that the full price in either case could lie at 4½ per cent. interest during the pleasure of the Corporation; or it, or any portion thereof, would be accepted at one month's notice. Before reading the letter, the Town Clerk stated that Mr. MacGregor had informed him that he wrote the letter as the Agent of the Company. Some discussion took place on the subject; and the Town Clerk briefly explained the terms of the Act of Parliament under which gas-works were acquired by corporations in Scotland. The leading newspaper in the town says that the Council have replied to the really liberal offer of the Company by shelving the question for an indefinite period. From the tenor of the discussion, it may be concluded that the propriety of acquiring the gas-works for the benefit of the town will be made a rallying cry before the next November elections.

An ordinary monthly meeting of the Gourock Burgh Commissioners was held on Tuesday, when the gas accounts for the past year were brought up for consideration. They showed a net surplus of £261; the revenue having been £2878, and the expenditure £2146, excluding £470 as interest and repayment of the loan for the purchase of the works. On the motion of Commissioner Chalmers, the Gas Manager (Mr. M'Ewan) was awarded a well-deserved vote of thanks for his services during the past year. On the motion of Commissioner Tait, seconded by Bailie Gunion, it was decided to abolish meter-rents.

The Greenock Police Commissioners on Tuesday also had their annual gas statement for consideration. How to dispose of the surplus (fully £2000), gave rise to some discussion; in the course of which some of the speakers indicated their opinion that it should be used in paying for the new gasholder, instead of being handed over to the "Common Good" of the town. One of the members, who would like to see the gas profits shared by the gas consumers only, has given notice of motion for the next meeting, to the effect that the price of gas be reduced 2½d. per 1000 cubic feet—from 3s. 4d. to 3s. 1½d. The motion will meet with some opposition, as the Gas Commissioners are not yet sufficiently educated to do the right thing in gas matters.

The past year has been a successful one with the Ardrossan Police

Commissioners, as the Gas Trust. From a copy of the balance-sheet now before me, I find that there is a net balance of £287 to carry over to next year's account, after meeting all the expenses of the year. The Gas Committee lately resolved, on the recommendation of Mr. Gillespie, of Glasgow, to fit up one of Young's exhausters at a cost of £213. By the way, the balance from the last account of the undertaking was £187; so that the improvement for the year reached £100.

The Dunoon Gas Company are about to inaugurate a new telescopic gasholder, which is 60 feet in diameter and 32 feet deep. It is contained in a tank which has been constructed of cast-iron plates, and holds 290,000 gallons of water, the filling of which was successfully carried out last Tuesday. The contract for the holder and cast-iron tank was executed by Messrs. Hanna, Donald, and Wilson, according to plans and specifications prepared by Mr. David Robertson, Manager to the Gas Company.

With regard to the use of gas-stoves, I may here mention that up to the 26th of the present month, there had been sent out on hire by the Glasgow Corporation Gas Stove Department 8417 stoves, range-fittings, &c., exclusive of those that had been returned up to that date. There had also been sold 10,710 stoves, fires, and other gas-heating appliances of various kinds. The Gas Committee have set a good example to users of power for driving machinery. They have accepted a tender of the Stockport Gas-Engine Company to supply one of their 15-horse power engines for the workshops at Tradeston gas-works.

Business has been quiet this week in the Scotch iron trade. With the exception of Scotch warrants, the prices of which are artificially maintained by the London bull syndicate, the values of pig iron in the open market are materially reduced. Cleveland warrants have declined 6d. to 8d., and Cumberland hematite about 10d. per ton in the course of the week. The former is now selling at 40s. 3d., and the latter at about 50s. 3d. per ton. Yesterday's closing price for Scotch warrants was 47s. 7½d. per ton cash buyers. The demand for pig iron has been exceptionally quiet in consequence of workmen's holidays. There is rather more inquiry for hematite pigs, although the consumption of this iron is smaller than it was some time ago, owing to the slackness in shipbuilding steel. Cleveland pig iron is in good demand; but increased supplies render it lower in price. The output of Scotch pig iron has been enlarged by the lighting of three additional furnaces; and makers are now able to supply the wants of the trade direct from the iron-works. The necessity for taking pig iron out of the warrant stores is therefore almost a thing of the past. The prospects all round are not hopeful; but so long as the stock of Scotch warrant iron remains in the hands of the present holders, it is impossible to say when any change in the position may take place.

The local coal trade has been steady this week, notwithstanding the occurrence of the annual holidays. A fair amount of business is passing in respect of ell coal, a lot of which is usually shipped to Ireland at this time of the year. No material change has taken place in respect of any other kinds of coal.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *July* 25.

Sulphate of Ammonia.—There is a somewhat better feeling; and the few spot parcels available find buyers readily. Still the improvement in prices, if any, is very slight. At Hull, the transactions have been small; and £10 13s. 9d. to £10 15s. is now quoted. At Leith, however, a considerable business has taken place at £10 10s. to £10 11s. 3d.; but sellers are now asking £10 12s. 6d. The latter is to-day's price here. There are still numerous buyers for future delivery; but there are very few sellers now, and it is difficult to arrange business. Nitrate is unchanged, at 8s. 6d. per cwt.

LONDON, *July* 25.

Tar Products.—The better tone noted last week continues; and, although, on account of the small make at the moment, there is no important business doing, still makers find a much readier market. Benzol is firmer; and 50 per cent., which has been unsaleable for many months, is now inquired for. Tar oils are moving off at a little better price; but there still appear to be considerable stocks in existence. Carbolic acid is a little brisker, owing to the warmer weather; but it is at a ridiculously low price, and scarcely worth the trouble of extraction. A contract for a considerable quantity of "A" anthracene is mentioned; but the price has not transpired. It is thought, however, that the sale has resulted in a price somewhere between 1s. 3d. and 1s. 4d. Pitch buyers are active; and the position of this article for the ensuing season seems pretty well assured. Solvent naphtha does not recover its former activity; but it is moving off more freely. The following are about to-day's values: Tar, 23s. 6d. to 29s. Pitch, 34s. 6d. Benzol, 90 per cent., 4s.; 50 per cent., 2s. 10d. Toluol, 1s. 7½d. Solvent naphtha, 1s. 5d. Crude naphtha, 1s. 2d. Creosote, 1¾d. Carbolic crystals, 6d.; crude, 60's, 1s. 4d. Cresol, 8d. Anthracene, "A" quality (nominal), 1s. 4d.; "B" quality, 10½d. to 11d.

Sulphate of Ammonia.—Low prices still rule in this market, and business has been done as low as £10 8s. 3d. for country make, to £10 15s. for London and similar convenient ports. There is a complete absence of inquiry from foreign sources. The small business being done is entirely of a speculative character, and to dealers. Stocks are said to be small; and as the make is at its minimum, manufacturers are not anxious about present values. But there is a strong feeling of hope that the autumn will see an important improvement in prices. A very large business is expected, as soon as the short shipments of nitrate and the stocks of sulphate (as well as nitrate) abroad are realized by consumers. Gas liquor is selling at from 4s. to 5s.

The Proposed Purchase of the Norwich Water-Works by the Corporation.—At the meeting of the Norwich Town Council last Tuesday, the Town Clerk read a letter from the Secretary of the Norwich Water Company, to the effect that the Committee had placed the proposal of the Corporation before the Board of Directors, who had unanimously resolved that the offer was not one they could approve or would feel justified in submitting to the shareholders. The letter was referred to the Water-Works Committee.

THE LANCASHIRE GAS COAL TRADE.

From Our Own Correspondent.

Since my last report, there has not been any business of moment, so far as gas coals are concerned; the contracts for the present season being now practically completed. But it may be noticed that the orders which have been placed this year have for the most part been confined to supplies for twelve months only; consumers being evidently of opinion that, although they have not been able to obtain, except in very special cases, concessions of more than about 6d. per ton upon last season's prices, next year they will in all probability be in a much better position to enforce more favourable terms. Another feature to notice in connection with this season's trade is that the advance in the price of Lancashire cannel, to which I referred in my last report, has resulted in cannel from the Yorkshire district competing in this market; and Yorkshire colliery-owners have been able to place considerable quantities. Certainly, in some instances, they have been offering at prices which could not fail to secure business; and this would seem to favour the belief that they are determined to secure a larger share of the Lancashire contracts, not only in ordinary screened gas coals, but in the better qualities of cannel. With one or two contracts I have heard of, there has been a considerable margin in the quotations for the cannel offered from Yorkshire, regarded as of quite equal quality to the local supplies, and what would seem to be a most unnecessary cutting down in price for the sake of securing business. With regard to other descriptions of fuel, although there is a continued lessening off in the demand, especially in the better qualities suitable for house-fire purposes, prices are being maintained with exceptional firmness. In fact, so far as the best qualities of house-fire coal are concerned, it is only on occasional special sales of large quantities, for delivery during the next couple of months, that buyers are able to obtain any appreciable concession upon what are practically winter rates. Stocks are beginning to accumulate more freely at some of the collieries. But, generally, complaints are still made that the men are restricting the output; and in most cases the winter will be entered upon with less than the average quantity of coal shown on the pit banks. For best Wigan Arley, quotations remain firm at from 12s. to 12s. 6d. per ton; second qualities, from 10s. 6d. to 11s.; Pemberton four-feet, 10s. to 10s. 6d.; and common house-fire coals, 9s. to 9s. 6d. The lower qualities of round coal, as previously pointed out, owing to the slackening off in some of the principal coal-using industries, are in lessened demand, with prices weak, if anything; but it is only to move away quantities for shipment that colliery proprietors are accepting what may be regarded as really low figures. For inland sales, ordinary steam and forge coals at the pit's mouth do not average less than 7s. 9d. to 8s. 3d. per ton; but for shipment, ordinary steam coals can be bought readily at 9s. to 9s. 3d. per ton, with better qualities not averaging more than 9s. 9d. to 10s. Engine classes of fuel remain in much the same unsatisfactory position that has been reported for some time past. At the pit's mouth, burgy can be bought at 6s. 9d. to 7s. 3d., the best qualities of slack do not average more than 6s. to 6s. 6d., and common sorts are readily obtainable at 3s. 9d. to 4s. 3d. per ton. For coke, prices show a decided downward tendency. The best foundry cokes made in the Lancashire district do not average more than 16s. to 17s. per ton, and common cokes can be bought at 12s. to 13s. per ton at the ovens.

Northern Coal Trade.—There is activity in the coal trade of the North, in both the gas and steam branches. Best Northumbrian steam coal is steady, at from 12s. 3d. to 12s. 6d. per ton, free on board; and most of the collieries have full order-books. Small steam coals are very plentiful, and command from 4s. 6d. to 4s. 9d. per ton. For gas coals, the demand is steadily increasing; but the prices vary greatly, and may be put as from 9s. to 10s. per ton free on board, with many sales between these figures. There are additional contracts in the market both for local and distant gas companies; but some of the chief of the gas coal collieries have now very little free coal. It would appear that the enlargement of the consumption has taken up the output well; and therefore it is possible that additional supplies may have to be paid for at a higher rate. Bunker coals are quiet at about 9s. per ton for unscreened, and up to 12s. for the best Durham screened. Manufacturing coal is inactive. Coke is dull at about 16s. per ton free on board for best Durham kinds.

Extension of the Sheffield Gas Company's Offices.—The offices of the Sheffield United Gas Company have just been considerably extended. The existing main office, extending 80 feet back, has been added to to the extent of 105 feet; giving two large additional rooms. The new building, erected from the designs of the Company's officials, is three storeys high; the lower portion being used for storeage and fitting rooms. It is at the Sheffield Company's offices, in the vestibule leading to the Board and Committee rooms, that the ceiling is lavishly decorated with illustrative panels, showing the progress of light, from the moon and stars to gaslight.

Sales of Shares.—At one of Messrs. R. Fuller, Moon, and Fuller's recent periodical sales of shares at Croydon, they submitted 590 shares in local Gas Companies; and they fetched the following prices: £10 fully-paid shares (first issue) in the *Mitcham and Wimbledon Company*, £20 to £20 5s. each; £10 fully-paid shares of the second issue, £20 2s. 6d. each; £10 shares (£4 paid), £8 7s. 6d. to £8 12s. 6d. each; £5 fully-paid shares (third capital) in the *Croydon Company*, £11 2s. 6d. each; £5 fully-paid "B" shares (1876) fetched £11 each; £10 fully-paid shares in the *Carshalton Company*, £18 5s. each; £10 shares (£2 paid) in do., £3 5s. to £3 12s. 6d. each. All the shares were sold except a few partially paid up Carshaltons; the lot realizing upwards of £8500.——Messrs. Drew and Son, of Richmond, recently sold five £100 lots of stock of the *Richmond Gas Company*, at an average price of £148 19s. 1d. each; and a £50 lot for £74 5s. The total amount realized was £819 5s.——Last Friday Messrs. Gurney and Swannell sold by auction 140 shares of £5 each in the *Rickmansworth Gas Company*; the price realized being from £8 11s. to £9 2s. per share.

British Water Gas Company.—Additional plants are now in progress by this Company; the most important being one for the Lancaster Waggon Company. Others are being erected at Spencer's Steel-Works, Newburn; the Glasgow Iron and Steel Company; Bolton Hall, Bolton-on-Dearne; and Messrs. Moss Brothers' Fustian Manufactory, Eastwood.

Proposed Railway Sidings for the Coventry Gas-Works.—An old question as to the advisability of having sidings from the Nuneaton line into the Coventry Gas-Works, which gave rise to considerable opposition some two years ago, was revived at the meeting of the City Council last Tuesday. Two reports have been prepared—one some time ago by Mr. G. Livesey, and a more recent one by Mr. Woods. The question was the subject of a long debate; but no decision was arrived at—the whole matter being referred to a Committee of the entire Council. It was stated in the course of the somewhat confused discussion that the proposal, if carried out, would result in a saving of £1700 a year, which would be equal to a district rate of 3d. in the pound. On the other hand, the question arose as to whether it would be worth while to spend from £15,000 to £20,000 in making a railway connection, when possibly new gas-works would be required to meet the growing demands. This is the difficulty the Council will have to face when they come to consider the subject.

The Water Supply of Chester.—Publicity is given to a suggested scheme for the supply of water to Chester and Shrewsbury; and several private gentlemen from the former city, with a number of others from Shrewsbury, visited Dolydd-Ceiriog a few days ago; the idea being that a miniature Vyrnwy Lake might be formed at that point. The proposed lake would contain 600 million gallons of water, with an average depth of 10 feet, an area of 100 acres, a length of about a mile, and a watershed of some 8000 acres. "The proposal," says a Chester correspondent to a local paper, "is hardly likely to be treated seriously, however, in Chester, where the view is generally held that the outcry against the present water supply is founded on personal and political motives rather than upon any defect in the water. Chester water has been pronounced by experts to be good, pure, drinking water; and the 'infinitesimal' (to use Dr. Tidy's word) danger of contamination is illustrated by the fact that Dr. Ballard, of the Local Government Board, whose report was made the excuse for the attack on the Water Company, has taken up his residence in Chester."

Colne Valley Water Company.—Next Saturday the shareholders of this Company will assemble at the pumping-station at Bushey on the occasion of the thirty-fifth half-yearly meeting. In the report to be submitted by the Directors (which is signed by Mr. W. Verini, the Secretary), they state that the additional amount of capital expended during the six months ending June 30 was £2083, of which more than £1400 was for further payments in connection with the new engine. This has been completed, and has been working regularly since the end of May, with, as Messrs. Taylor and Sons, the Company's Consulting Engineers, report, very satisfactory results. The balance on capital account being nearly exhausted, it was decided to raise a further £5000 by the issue of new £10 shares, so as to provide for the final payments for the new engine, and for further extensions during the next year or so. The shares were offered to the proprietors at the end of June, and up to the present a sum of £4150 has been applied for. The net profit in respect of the revenue account was £3279 14s. 4d.; being an increase of £196 4s. 2d. as compared with the corresponding period of 1890. This, the Directors think, may be considered very satisfactory, as the long-continued and severe frost experienced during the past winter necessitated the exceptionally large outlay of £291 on the pipe system. The dividend and interest account shows a balance of £1917, after paying the 4 per cent. interest on the debenture stock and preference shares; and out of this balance it is proposed to pay a dividend at the rate of 3 per cent. per annum—leaving £94 to carry forward. The total number of supplies laid on throughout the Company's district now amounts to 5547; and the quantity of water supplied for all purposes during the six months was 148 million gallons, as compared with 145 millions in the corresponding half of 1890.

The Vyrnwy Water in Liverpool.—At the meeting of the Water Committee of the Liverpool Corporation last Tuesday, the Water Engineer (Mr. Parry) reported that Vyrnwy water has been flowing into the No. 1 Prescot reservoir since the previous meeting of the Committee, at the rate of 3,430,000 gallons per day, except that on the 17th inst. it was shut off by arrangement for a further examination of the joints at the Mersey crossing, and for putting trenches into the Vyrnwy aqueduct for the supply of water to Tarporley and Malpas. The operations on the pipe-line to the south of Norton involved the shutting off of the water at Oswestry, and the main had to be slowly re-charged; so that the full supply into Prescot was not restored until the afternoon of the 19th inst. Since then there had been a steady and continuous delivery. A small supply of the Vyrnwy water was turned into the No. 2 reservoir at Prescot, to mix with the Rivington water for Liverpool, on the 16th inst. The quantity had since been increased; and at present nearly 2 million gallons per day of Vyrnwy water was being mixed with the Rivington supply for distribution. Some conversation took place in reference to the quality of the new water. One member stated that he had spent a week at Vyrnwy, and had come to the conclusion that the water was not fit to drink; whereas another, who had examined it at Prescot, pronounced it to be very good. The Chairman (Alderman Garnett) said the adverse remarks which had been made, had been amply answered by a gentleman who had seen and tasted the new water as it ran into the reservoir at Prescot. Those who remembered the opening of the Rivington works would recollect that there was then much the same difference of opinion as to the quality of the water; but for many years the citizens had been perfectly satisfied with it. He had no doubt that eventually the Vyrnwy water would be found to be as satisfactory and as good as that from Rivington. He wished to emphasize one point in regard to quality, and that was that it was a question of rather more or less discolouration. The water was perfectly pure chemically, and was as wholesome as anybody could get. It seems that by the assistance of the Vyrnwy water, restrictions which have lately been placed upon the consumers will be removed, and a full supply afforded.

Joseph Evans and Co., Limited.—A Company has been registered under this title, with a capital of £10,000, in £5 shares, to adopt an agreement made between Joseph Evans of the one part and the Company of the other, for the acquisition of the undertaking of Joseph Evans, of 118, Charles Henry Street, Birmingham, and to carry on there the business of a tube manufacturer, and manufacturers of, and dealers in every variety of metal work.

The Water Supply of Stainland.—For several years great difficulty has been experienced by residents in the Stainland district in procuring water. The Huddersfield, Halifax, and Wakefield Corporations were all approached with a view to obtaining a supply from their reservoirs; but, owing chiefly to the altitude of the district to be served, and for other reasons, it was found impossible to ensure a supply from any of these sources. A scheme known as the Coldacre scheme was propounded by Mr. G. H. Crowther, C.E., of Huddersfield; and this was adopted by the Local Board, who, after a lengthened controversy, obtained the sanction of the Local Government Board to proceed with the work. The cost of the scheme is estimated at rather more than £10,000. It comprises, in addition to distributing mains, the construction of a reservoir capable of holding 6 million gallons of water. An admirable site of 13 acres has been procured on the Coldacre Farm, situate in one of the highest parts of the Stainland district, at an altitude of 1000 feet above sea level. The water from twelve springs is to be impounded, and tests have proved that even in very dry seasons these springs yield from 10,000 to 15,000 gallons per day, and in wet seasons about 200,000 gallons per day. The works were formally commenced a few days ago, by the Chairman of the Local Board, Mr. J. Quarmby, cutting the first sod of the reservoir.

The Supply of Hydraulic Power in Birmingham.—The formal opening of the new high-pressure station built by the Water Department of the Birmingham Corporation in Dalton Street, took place on the 18th inst., in the presence of the Mayor (Alderman Clayton) and other members of the City Council. Mr. J. W. Gray, the Corporation Water Engineer, was present to give a technical explanation of the working under the new conditions. The event has special interest for our readers, inasmuch as this is the only hydraulic station in England depending upon gas for engine power. Three engines have been put in, two of which are of 50-horse, and one is of 25-horse power. Their purpose is to pump water into two large accumulators, which are weighted with furnace slag to the extent of 80 tons each. The slag is carried in two upright cylinders, raised by 20-inch rams, 20 feet long. The joint effect of the weight of the two cylinders is that of a ram 40 feet high weighted with 80 tons; and this enormous mass, resting on the two columns of water, gives to them and to the water in the mains connected with them the high pressure of more than 700 lbs. per square inch. Mr. Gray, in the course of his explanation, pointed out that the pressure could be raised to 800 lbs. As they could not have a reservoir some 1600 feet above the station, they had accumulators. The machinery was self-acting, and the arrangements were such that he believed absolute safety was ensured so far as the internal works were concerned. With regard to the cost, he pointed out that a lift for which at present he was authorized to charge £16 or £17 a year would now be worked at £13. Instead of using 70,000 gallons of water, only 7000 gallons would be required under the new conditions; and the Water Department would save the difference.

The Sheffield Water Supply and Lead-Poisoning.—The Sub-Committee appointed by the Water Committee of the Sheffield Corporation in the early part of last year to inquire into the subject of lead-poisoning, caused by the contact of the Redmires water with lead pipes, have agreed upon their final report. The Committee, as reported in the JOURNAL, Vol. LV. (p. 509), made a preliminary report when the inquiry was concluded. Their final report contains the recommendations of the expert members of the Committee (Dr. Bristowe, Professor Dewar, Mr. T. Hawksley, and Mr. E. M. Eaton), which recommendations have been adopted. The report of the latter is as follows: "In accordance with the resolution adopted at the conclusion of the public inquiry held in March, 1890, the water supply to the town and district from Redmires has since that time been continuously treated with chalk, for the purpose of preventing any action upon lead. In response to our inquiries, we have recently received communications from the medical and chemical experts who appeared before the Sub-Committee on that occasion, expressing their unanimous satisfaction with the means since successfully adopted in accordance with the recommendation of such Sub-Committee to effect the removal of the cause of complaint and their approval of the permanent continuance of the process now in operation. Copies of these communications accompany this report. Our own investigations and experience leads us to a similar conclusion. We have therefore pleasure in recommending: That with a view to the security of the community using the Redmires water from liability to injury from lead contamination, the process now adopted for treating that water with carbonate of lime in the form of chalk, or such modification thereof as experience may show to be an improvement thereon, be permanently continued; and that for the more satisfactory and the more economical application of the process, such apparatus be provided and fitted up as will permit the addition of the material to the water in an automatic manner. We may further remark that it is important for the process to be regular and continuous, because, if it were intermittent, other chemical complications might occur." The Sub-Committee, at their last meeting, advised Mr. Eaton to report to the Water Committee concerning any permanent apparatus desirable for the economical carrying on of the process of treatment, with an estimate of its cost. They also recommended that the correspondence referred to in the foregoing report be printed, and a copy sent to each member of the Council, and to those members of the Sub-Committee who are not in the Council. The report of the Sub-Committee was considered at a subsequent meeting of the Water Committee, when it was resolved that the report be adopted, except that the letters of the local medical practitioners in reply to Dr. Bristowe be not published in full. The minutes of the Committee will contain Dr. Bristowe's letter, which summarizes the various replies received by him from local medical practitioners.

Paraffin Lamp Accident at Sheffield.—A steel caster, named Beeley, living in Matilda Road, Sheffield, locked up his house last Saturday night, leaving an infant in a cradle in the kitchen, and a paraffin lamp burning on the table. It is conjectured that a cat jumped upon the table and upset the lamp. The furniture was set on fire; and when the flames were discovered, the room was in a blaze. A man, looking through the window, saw the child waving its arms above the cradle. He entered the kitchen through the smoke, and succeeded in getting the cradle to the window, where it was lifted through; but the child was then dead—being terribly burnt.

The London County Council and the Water Question.—At an adjourned meeting of the London County Council which took place last Friday, the Chairman (Sir John Lubbock, Bart., M.P.) made an important statement in reference to the position of the Council in regard to the water question. He said that, in accordance with the resolution of the Council, he had introduced a Bill to enable them to promote Bills dealing with the water supply of London. As, however, the members were aware, the Bill had been blocked. In consequence of the report of the House of Commons Committee on Water Supply, which was substantially in accordance with that Bill, he had asked the Government if they could give him facilities with reference to the measure. They, however, declined to do so. [See our "Parliamentary Intelligence."] He could not be surprised at their answer; but, under these cirumstances, he feared he had no option but to drop the Bill. He hoped, however, that it would be understood that the Council had done all they could; and no responsibility as regards the supply of water to London rested upon them.

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(For Stock Market Intelligence, see ante, p. 158.)

Issue.	Share	When ex-Dividend.	Dividend or Div. & Bonus.	NAME.	Paid per Share	Closing Prices.	Rise or Fall in Wk.	Yield upon investment
£			p. c.	GAS COMPANIES.				£ s. d.
590,000	10	10 Apl.	10½	Alliance & Dublin 10 p. c.	10	17—18	..	5 16 8
100,000	10	,,	7½	Do. 7 p.c	10	11½—12½	..	6 0 0
300,000	100	1 July	5	Australian (Sydney) 5 % Deb.	100	104-106	..	4 14 2
100,000	20	28 May	8	Bahia, Limited	20	15—17	..	9 8 3
200,000	5	13 May	7½	Bombay, Limited	5	6½—7	..	5 7 1
40,000	5	,,	7½	Do. New	4	4¾—5¼	..	5 14 1
380,000	Stck.	26 Feb.	12½	Brentford Consolidated	100	220—225	..	5 8 10
125,000	,,	,,	9½	Do. New	100	160—164	..	5 12 10
220,000	20	12 Mar	11½	Brighton & Hove Original	20	40—42	..	5 9 6
320,000	20	10 Apl.	11½	British.	20	43—45	..	5 0 0
50,000	10	12 Mar.	11	Bromley, Ordinary 10 p. c.	10	18—20	..	5 10 0
39,000	10	,,	8	Do. 7 p. c.	10	13—15	..	5 6 8
328,750	10	13 Nov.	6	Buenos Ayres (New) Limited	10	7⅞—8¼	..	—
200,000	100	1 July	6	Do. 6 p. c. Deb.	100	92—97	..	6 3 9
150,000	20	26 Feb.	8	Cagliari, Limited	20	25—27	..	5 18 6
550,000	Stck.	10 Apl.	13¾	Commercial, Old Stock	100	255—265	..	5 3 9
130,000	,,	,,	10¾	Do. New do.	100	190—200	..	5 7 6
130,000	,,	26 June	4½	Do. 4½ p. c. Deb. do.	100	119—124	..	3 12 7
557,320	20	11 June	13	Continental Union, Limited	20	46—48	..	5 8 4
242,680	20	,,	13	Do. New '69 & '72	14	—	..	—
200,000	20	,,	10	Do. 7 p. c. Pref	20	38—40	..	5 0 0
75,000	Stck.	25 Mar.	10	Crystal Palace District	100	200—205	..	4 17 7
486,090	10	15 July	10	European, Limited	10	20—21*	..	4 15 3
354,060	10	,,	10	Do. Partly paid	7½	14½—15½*	..	4 16 9
5,470,630	Stck.	12 Feb.	13	Gaslight & Coke, A, Ordinary	100	240—245	..	5 6 1
100,000	,,	,,	4	Do. B, 4 p. c. max.	100	96—99	..	4 0 9
665,000	,,	,,	10	Do. C, D, & E, 10 p.c. Pf.	100	256—261	..	3 16 7
30,000	,,	,,	5	Do. F, 5 p. c. Prf.	100	120—125	..	4 0 0
60,000	,,	,,	7½	Do. G, 7½ p. c. do.	100	175—180	..	4 3 4
1,300,000	,,	,,	7	Do. H, 7 p. c. max	100	162—166	..	4 4 4
463,000	,,	,,	10	Do. J, 10 p. c. Prf.	100	254—259	..	3 17 3
476,000	,,	,,	—	Do. K, 6 p. c. Prf.	100	155—160	..	3 15 4
1,061,150	,,	11 June	4	Do. 4 p. c. Deb. Stk.	100	112-115	..	3 9 5
294,850	,,	,,	4½	Do. 4½ p. c. do.	100	120-125	..	3 12 4
908,000	,,	,,	6	Do. 6 p. c. do	100	163-168	..	3 11 0
3,800,000	Stck.	13 May.	12	Imperial Continental	100	225-230	..	5 4 6
75,000	5	26 June	6	Malta & Mediterranean, Ltd.	5	4¼—5	..	6 0 5
560,000	100	1 Apl.	5	Met. of Melbourne, 5 p. c. Deb.	100	111—113	..	4 8 7
541,920	20	11 June	2½	Monte Video, Limited.	20	17—18	..½	7 4 0
150,000	5	28 May.	10	Oriental, Limited	5	8¼—8¾	—¼	5 14 3
60,000	5	25 Mar.	7	Ottoman, Limited	5	4¼—5¼	..	6 7 3
166,870	10	26 Feb.	2	Pará Limited.	10	3—4	..	—
				People's Gas of Chicago—				
420,000	100	4 May	6	1st Mtg. Bds..	100	92—97	..	6 3 9
500,000	100	1 June	16	2nd Do.	100	90—95	..	6 6 4
150,000	10	28 Apl.	10	San Paulo, Limited	10	14—15	—½	6 13 4
500,000	Stck.	26 Feb	15½	South Metropolitan, A Stock	100	285—290	+1	5 6 11
1,350,000	,,	,,	12	Do. B do.	100	243—248	+1½	4 16 9
166,500	,,	,,	13	Do. C do.	100	242—250	..	5 4 0
678,000	,,	26 June	5	Do. 5 p. c. Deb. Stk.	100	139—143	..	3 10 0
60,000	5	12 Mar.	11½	Tottenham & Edm'nton, Orig.	5	11—13	..	4 8 5
						*Ex div.		
				WATER COMPANIES.				
729,281	Stck.	26 June	10	Chelsea, Ordinary	100	260—265	..	3 15 6
1,720,560	Stck.	10 Apl.	8	East London, Ordinary	100	211—216	—1	3 14 1
544,440	,,	26 June	4½	Do. 4½ p. c. Deb. Stk.	100	138—143	..	3 3 0
700,000	50	11 June	8	Grand Junction	50	107—111	..	3 12 0
708,000	Stck.	12 Feb.	10½	Kent	100	265—270	..	3 17 10
1,043,800	100	26 June	9½	Lambeth, 10 p. c. max.	100	233—238	—3	3 19 10
406,200	100	,,	7½	Do. 7½ p. c. max.	100	192—197	..	3 16 2
260,000	Stck.	25 Mar.	4	Do. 4 p. c. Deb. Stk.	100	118—123	..	3 5 0
500,000	100	12 Feb.	12½	New River, New Shares	100	347—352	..	3 8 10
1,000,000	Stck.	28 Jan.	4	Do. 4 p. c. Deb. Stk	100	125—128	..	3 2 6
902,300	Stck.	11 June	6½	S'thwk & V'xhall, 10 p. c. max.	100	165—170	—1½	3 16 5
126,500	100	,,	6½	Do. 7½ p. c. do.	100	160—165	..	3 18 9
1,155,066	Stck.	11 June	10	West Middlesex.	100	250—260	..	3 16 11

GWYNNE & BEALE'S PATENT GAS EXHAUSTERS AND ENGINES

Telegrams: "GWYNNEGRAM LONDON."

GWYNNE & CO.,

TELEPHONE No. 2698.

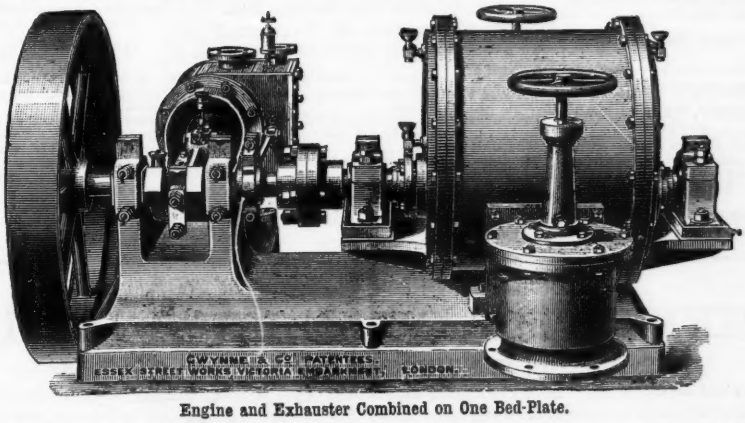
HYDRAULIC AND GAS ENGINEERS, ESSEX STREET WORKS, VICTORIA EMBANKMENT, LONDON, W.C.

Thirty-three Medals at all the Great International Exhibitions have been awarded to GWYNNE & Co., for Gas Exhausters, &c.

They have never sought to make price the chief consideration, but to produce Machinery of the very highest quality.

The result is that in every instance their work is giving the fullest satisfaction.

They have completed Exhausters to the extent of 30,000,000 cubic feet passed per hour, which are giving unqualified satisfaction in work, and can be referred to.



Engine and Exhauster Combined on One Bed-Plate.

GWYNNE & Co.'s Exhausters are constructed of large size to pass the required quantity of Gas at very slow speeds; the wear and tear being reduced to a Minimum.

Catalogues and Testimonials sent on Application.

Their Exhausters can be made, when desired, on their New Patent Principle, to pass Gas without the slightest oscillation or variation in pressure.

NO OTHER MAKER CAN DO THIS.

Makers of GAS-VALVES, HYDRAULIC REGULATORS, VACUUM GOVERNORS, STEAM-PUMPS for Tar, Liquor, or Water; PATENT SELF SEALING AND CLEANSING RETORT-LIDS AND MOUTHPIECES; CENTRIFUGAL PUMPS and PUMPING ENGINES, specially adapted for Water-Works, raising Sewage, &c.

Also GIRARD and other TURBINES, HIGH-SPEED ENGINES, DYNAMOS, &c., &c., for ELECTRIC LIGHTING.

NOTICE TO ADVERTISERS.—COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office *not later* than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or Stoppages of PERMANENT ADVERTISEMENTS should be received not later than the FIRST POST on SATURDAY.

OXIDE OF IRON.

O'NEILL'S Oxide has a larger annual sale in the United Kingdom than all other Oxides combined. Purity and uniformity of quality guaranteed. Pamphlet, "How to Purchase Bog Ore," to be obtained on application.
Gas Purification and Chemical Company, Limited, Palmerston Buildings, Old Broad Street, London, E.C.
JOHN WM. O'NEILL, Managing Director.

GAS PURIFICATION AND CHEMICAL COMPANY, LIMITED.

ANDREW STEPHENSON, Agent.
Please address all communications to the Company, as above.

ANDREW STEPHENSON, Agent for BRIN'S OXYGEN COMPANY, Limited, Westminster, S.W.
City Address: 182, Gresham House, Old Broad Street, LONDON, E.C.

CANNEL COAL, ETC.

JOHN ROMANS & SON, EDINBURGH.
Gas Engineers, supply all the most approved SCOTTISH CANNELS; also FIRE-CLAY GOODS, CAST-IRON PIPES, and other APPARATUS for GAS AND WATER WORKS.
Prices, &c., will be forwarded on application to No. 80, ST. ANDREW SQUARE, EDINBURGH, / NEWTON GRANGE, NEAR DALKEITH, } SCOTLAND.

TAR and Liquor wanted.
BROTHERTON AND CO., Commercial Buildings, LEEDS.

WANTED, a Situation as Good General Smith.
Apply to T. SMITH, 27, Cornwallis Street, HASTINGS.

SITUATION wanted by the Advertiser.
Well up in Coal Tar Distilling, Sulphate Making, and thoroughly understands rectifying Naphtha, having for some time past worked one of the largest plants for making Benzole and Solvent Naphtha in England. Age 36.
Address No. 1984, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

TO GAS COMPANIES, GAS ENGINEERS, AND OTHERS.

THE Advertiser, who has had over 20 years' experience in the Manufacture and Distribution of Gas, and the Management of Gas-Works, and has been a Member of the British Association of Gas Managers and The Gas Institute for 17 years, also a Member of two District Associations a combined period of about 12 years, is desirous of meeting with an appointment as Manager of Gas-Works, or Manager of several Gas-Works for a Lessee, or to represent Manufacturers of any description of Gas Apparatus or Gas Appliances. Good testimonials and references.
Address No. 1981 care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, Two Retort-Setters. Wages 10½d. per hour. Four months' work for good men.
Apply Torquay Gas-Works, DEVON.

AGENTS Wanted for North and South of England, Wales, Scotland, and Abroad for a first-class article extensively used in all Gas-Works. Only men with first-class connections need apply.
Address, stating connection and experience, No. 1980, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

STOKER wanted at once for a small Gas-Works in South Wales. Constant work, and House on Works. Two Retorts in Summer, four in Winter.
Apply by letter to No. 1933, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

REDHILL GAS COMPANY, SURREY.

WANTED, a good, steady, married Man, about 30 years of age, as FITTER. Must be well up in working Iron and Compo. Pipes, fixing Meters, Stoves, Gas-Fires, &c., and have some knowledge of a Gas Plant. To a thoroughly good man the situation will be a permanent one. Wages 30s. per week, with small Cottage on Works.
Applications to be sent to the undersigned.
C. READ,
Manager, &c.

JAMES LAWRIE & CO. supply Best SCOTCH CANNEL COALS, Best FIRE-CLAY RETORTS, BRICKS, TILES, and LUMPS; BOILER SEATING BLOCKS, FLUE COVERS, and SILICA BRICKS for SPECIAL FURNACE WORK; COKE BARROWS, BOGIES, and SMALL WAGONS.
Postal Address: 1, WHITTINGTON AVENUE, E.C.
Telegram Address: "EIRWAL LONDON."

W. C. HOLMES & Co., Huddersfield, AND 80, CANNON STREET, LONDON,
Contractors for Gas-Works complete, Makers of Gasholders, Purifiers, Scrubbers, Condensers, Retort Fittings, &c., Improved Valves, Engines, and Exhausters. Also for Collingwood's Regenerative Retort-Settings.
*** See Advertisement p. 184 of this week's issue.
Cablegrams: "Ignitor London." Telegrams: "Holmes Huddersfield."

J. & J. BRADDOCK, Globe Meter Works, Oldham.
First-Class Award, Melbourne Exhibition, 1889, for WET AND DRY GAS-METERS, STATION METERS, AND GOVERNORS, PRESSURE-GAUGES, STREET LAMPS AND PILLARS, &c.
Telegraphic Address: "Braddock, Oldham."

COZE'S Automatic Apparatus for CHARGING AND DISCHARGING GAS-RETORTS. For Illustrated Advertisement of this System, see p. 41.
Inquiries should be addressed to THE AUTOMATIC COAL-GAS RETORT COMPANY, LIMITED, 86-88A, LEADENHALL STREET, E.C.

RAILWAY Tanks for Hire or Sale.
Address BROTHERTON AND CO., Ammonia and Tar Distillers, LEEDS.

WANTED, a Fitter. One accustomed to Gas-Works preferred. Wages 24s. per week. Constant employment.
Apply, stating experience, to the MANAGER, Gas-Works, FALMOUTH.

WANTED, a Working Foreman for a Gas-Works manufacturing 60 Millions.
Applicants must possess a clear, sound knowledge of all routine work; be able to control and direct men; and be experienced in all Retort-House Work and Main and Service laying.
Preference will be given to a man able to execute Repairs and Renewals to Retort Benches.
Wages 30s. per week, with House, Gas, and Water free.
Applications, stating age and whether married or single, to be sent, with copies of testimonials, to No. 1962, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a small Station Meter for a Village Gas-Works. Make, about one million. Six Retorts in Winter; two in Summer. Storeage capacity, 8000 cubic feet.
Address, with terms, &c., to the Gas Company, Hadham, HERTS.

CORPORATION OF LEICESTER.
(GAS DEPARTMENT.)

TO LOCOMOTIVE ENGINE MAKERS.

THE Gas Committee of the above Corporation are requiring a LOCOMOTIVE ENGINE for their Aylestone Road Works.
For particulars apply to
ALFRED COLSON, M. Inst. C.E.,
Engineer and Manager.
Gas Offices, Millstone Lane,
Leicester, July 21, 1891.

TO OXIDE OF IRON MERCHANTS.

THE Corporation of Birkenhead are prepared to receive TENDERS for the supply of 200 tons of OXIDE OF IRON.
Forms of tender and any other information may be obtained from Mr. T. O. Paterson, Gas Engineer, Gas-Works, Thomas Street.
Tenders, sealed, and endorsed "Tender for Oxide of Iron," to be sent in to me not later than 5 p.m. on Friday, July 31, 1891.
The Corporation do not bind themselves to accept the lowest or any tender.
By order,
ALFRED GILL,
Town Clerk.
Town Hall, Birkenhead,
July 20, 1891.

IRISH BOG ORE OXIDE OF IRON.

GAS PURIFICATION.

BALE, BAKER, & CO., direct Importers from Ireland. Sample and Price on application.
OXIDE PAINT, SULPHURIC ACID, & Chemicals.
120 and 121, NEWGATE STREET, LONDON, E.C.

SULPHURIC ACID.

JOHN NICHOLSON & SONS, Chemical Works, LEEDS, specially produce this ACID from BRIMSTONE, for making SULPHATE OF AMMONIA of high quality and *good* colour. Delivery in our own Railway Tank-Wagons or Carboys. Highest references and all particulars supplied on application.

OXIDE OF IRON. Genuine Natural Bog ORE. QUALITY AND CONDITION GUARANTEED. Any quantity supplied at lowest rates.
D. M. NELSON AND SONS, GLASGOW. Telegraphic Address: "Gas Glasgow." Depôts throughout England and Scotland.

SADLER AND CO., LIMITED, MIDDLESBROUGH; ULVERSTON (BARROW); PORTS MOUTH; CARLTON; STOCKTON; 70, Wellington Street, GLASGOW; 58, Fountain Street, MANCHESTER; and 96, Reade Street, NEW YORK. Tar Distillers, Manufacturers of all TAR PRODUCTS, ALIZARINE and other TAR COLOURS, BICHROMES, OXALIC ACID, ALKALIES, LIQUOR AMMONIA, AMMONIA SULPHATE, &c.
Head Office: MIDDLESBROUGH. Correspondence invited.

MR. ALFRED KITT, Consulting Engineer, 5, VICTORIA STREET, WESTMINSTER, late Engineer of the Pimlico and Westminster Stations of The Gaslight and Coke Company.

MEIKLEJOHN'S PATENT IMPROVED SLIDE-VALVE ANTI-DIP.

DURING the illness of Mr. Neill Meiklejohn, Sole Patentee and Manufacturer of the above, all communications should be addressed to C. MEIKLEJOHN, Gas Engineer, OLDBURY.

FRIEDRICH LUX, Ludwigshafen am Rhein; and at No. 142, Great Portland Street, London, W.
LUX's Gas Regulators for every consumption.
LUX's single-stem Pressure-Gauges.
LUX's Regulator for Gas-Engines.
LUX's Gas-Balance.
LUX's new Gas Regulator for Inverted Lamps; and other Apparatus for Gas Lighting, &c.

TENDERS FOR TAR.

THE Directors of the Exeter Gaslight and Coke Company invite TENDERS for their surplus TAR for One year from the 14th day of October next.
Delivery on Company's Works, filled into Purchaser's tanks.
Payments, cash monthly.
Sealed tenders, endorsed "Tender for Tar," will be received by the undersigned on or before Tuesday, the 4th day of August next; but the Directors do not bind themselves to accept the highest or any tender.
By order,
W. A. PADFIELD,
Secretary and Manager.
Gas Offices, High Street, Exeter,
July 9, 1891.

NEWTOWNARDS TOWN COMMISSIONERS.

THE Newtownards Town Commissioners are prepared to receive TENDERS for the following, to be erected at their Works:—
One SINGLE GASHOLDER, 48 ft. 6 in. diameter, 12 feet deep.
Also two 12 feet square PURIFIERS, with valves and connections.
Tracings of plans and copies of specifications, with particulars, may be obtained on application to the Manager, Alexander Waddell, on payment of One Guinea, which will be returned on receipt of a *bond fide* tender.
The Commissioners do not bind themselves to accept the lowest or any tender.
Tenders, sealed, and endorsed "Gasholder," and addressed Thomas Mayne, Esq., Chairman, will be received by me up to Friday, the 7th of August.
WILLIAM HERON,
Town Clerk.
Newtownards, July 25, 1891.

Now Ready, Price 6s., bound in Cloth.

THE CHEMISTRY OF ILLUMINATING GAS.

By NORTON H. HUMPHRYS, Assoc. M. Inst. C.E., F.C.S.

The matter composing this book consists mainly of articles written for, and published in, the JOURNAL. The preface says: "In view of new processes that seem to fall in thick and fast one on the other, it has been several times suggested that they should be collected together, so as to form a record of the various gas-making processes that have been proposed in the past, together with some account of the natural laws that govern the manufacture and supply of Illuminating Gas."

The work contains chapters on: The Relative Cost of Light from Gas, Oil, and Candles; Products of Combustion; The Sulphur Question; The Composition of Illuminating Gas; Water Gas Various Gas-Making Processes; Oil Gas; Properties of Fluid Hydrocarbons; Tar for Gas-Making; Destructive Distillation Condensation; and Purification.

LONDON: WALTER KING, 11, BOLT COURT, FLEET STREET, E.C.

TAR AND AMMONIACAL LIQUOR.

THE Gas Committee of the Oswaldtwistle Local Board are prepared to receive TENDERS for the surplus TAR and AMMONIACAL LIQUOR produced at their Works for a period of One year commencing Aug. 1, 1891.

Full particulars can be had on application to Mr. T. Loxley, the Manager.

Tenders, endorsed "Tar," to be sent to the undersigned not later than the 29th inst.

WM. SANDEMAN,
Clerk to the Local Board.

Local Board Offices, Oswaldtwistle,
July 18, 1891.

TAR.

THE Directors of the Cheltenham Gas-light and Coke Company, are prepared to receive TENDERS for the purchase of the surplus TAR produced at their Gas-Works during Twelve months from the 1st of October next.

Particulars may be obtained from the undersigned, to whom tenders must be sent on or before the 6th of August next.

The Directors do not bind themselves to accept the highest or any tender.

R. O. PATERSON,
Engineer.

Gas-Works, Cheltenham,
July 18, 1891.

BOROUGH OF MACCLESFIELD.

THE Gas Committee are prepared to receive TENDERS for the REPAIR of their No. 1 GASHOLDER.

Particulars of the work can be had on application to Mr. H. H. Ford, Engineer, at the Works.

Tenders, sealed and endorsed, to be sent in not later than Saturday, the 1st day of August, 1891, addressed to the Chairman of the Gas Committee, Town Hall, Macclesfield.

The Committee do not bind themselves to accept the lowest or any tender.

(Signed) W. FREDK. TAYLOR,
Town Clerk.

July 20, 1891.

LEIGH LOCAL BOARD.

THE Gas Committee of the Leigh Local Board invite TENDERS for the purchase of the surplus TAR produced at their Gas-Works for a period of One year from the 1st of September next.

All particulars, with form of tender, may be had from the undersigned.

Sealed tenders, endorsed "Tar," and addressed to Mr. Alderman Thorp, Chairman, to be delivered at the Town Hall, Leigh, on or before Monday, the 17th of August next.

The highest or any tender not necessarily accepted.

ALFRED T. FLETCHER,
Engineer and Manager.

Gas-Works, Leigh, Lancashire,
July 25, 1891.

TO CONTRACTORS.

THE Market Harborough Gas Company invite TENDERS for

2000 Tons of Screened GAS COAL.
100 Tons of LIME.
26 Tons of SULPHURIC ACID.

The Coal must be sent in monthly and as directed by the Manager, Mr. Armitage, of whom any further information may be obtained.

Tenders, giving price per ton at Market Harborough Station, to be sent to Wm. Gilbert, Esq., Northampton Road, Market Harborough, by the 10th of August next.

The lowest or any tender not necessarily accepted.

CHAS. BURGOINE,
Clerk.

July 25, 1891.

BOROUGH OF DEWSBURY.

THE Gas Committee of the above Corporation invite TENDERS for the supply and delivery, during the Twelve months ending the 31st day of August, 1892, of:

1. SULPHURIC ACID.
2. WET AND DRY GAS-METERS.
3. CAST-IRON GAS AND WATER PIPES.

Specifications and forms of tender may be obtained on application to the Gas Engineer, Mr. Chas. A. Craven, Gas-Works, Savile Town, Dewsbury.

Tenders, under sealed covers, endorsed "Sulphuric Acid," "Meters," or "Cast-Iron Pipes" as the case may be, to be sent to me not later than Saturday, the 8th of August.

The Corporation do not bind themselves to accept the lowest or any tender.

By order,
E. MAWDESLEY,
Town Clerk.

Town Hall, Dewsbury,
August, 1891.

WEST MALLING GAS COMPANY.

TENDER FOR GAS COAL.

TENDERS are invited for the supply of about 500 tons (more or less) of Pelton Main or any other class of really good GAS COAL, to be delivered at the Company's Works, West Malling, between the 29th day of September, 1891, and the 30th day of June, 1892, in quantities of not more than 50 tons a month.

The name and quality of the Coal to be specified in the tender.

Terms, payments quarterly.

Sealed tenders, endorsed "Tender for Coal," to be forwarded to the Secretary by the 13th day of August next.

The Directors do not pledge themselves to accept the lowest or any tender.

By order,
HENRY D. WILDES,
Secretary.

West Malling, July 22, 1891.

THE GASLIGHT AND COKE COMPANY.

NOTICE is hereby given that a Half-YEARLY ORDINARY GENERAL MEETING of the Proprietors in this Company will be held at this Office on Friday, the 7th day of August next, at Twelve o'clock (noon) precisely, to transact the usual Business, including the declaration of a Dividend for the half year ending on the 30th day of June last.

By order,
JOHN ORWELL PHILLIPS,
Secretary and General Manager.

Chief Office: Horseferry Road,
Westminster, S.W., July 22, 1891.

SOUTH METROPOLITAN GAS COMPANY.

NOTICE is hereby given that the ORDINARY HALF-YEARLY GENERAL MEETING of the Proprietors of this Company will be held at the Bridge House Hotel, London Bridge, in the Borough of Southwark, on Wednesday, the 19th day of August next, at Two o'clock in the afternoon precisely, to receive the Directors' Report and the Accounts of the Company for the Half Year ending the 30th of June last, to declare a Dividend for the same period, and to increase the remuneration of the Secretary.

The Transfer Books will be closed from the 5th day of August, until after the Meeting.

By order,
FRANK BUSH,
Secretary.

Offices: 709A, Old Kent Road, S.E.,
July 27, 1891.

BARNET DISTRICT GAS AND WATER COMPANY.

NOTICE is hereby given that the ORDINARY HALF-YEARLY GENERAL MEETING of the Proprietors of the above Company will be held at the Guildhall Tavern, Gresham Street, in the City of London, on Friday, the 28th day of August next, at Half-past Twelve o'clock in the Afternoon precisely, to receive the Report of the Directors and the accounts for the Half Year ended the 30th day of June last, to declare a Dividend, and to transact the General Business of the Company.

The Transfer Books will be closed from the 15th to the 28th of August, both inclusive.

By order of the Board,
ALFRED LASS,
Secretary.

Offices: 30, Gracechurch Street, London,
July 17, 1891.

TO COAL MERCHANTS, SHIP OWNERS, AND OTHERS.

THE Directors of the Torquay Gas Company are prepared to receive TENDERS for the supply for One, Two, or Three years, of about 12,000 tons per year (or such other quantity as may be agreed on) of best approved DURHAM GAS COAL.

Tenders to state the price of the Coals, and the freight to Torquay and Dartmouth, separately and together; and also for delivery into the Company's Works adjoining the Great Western Railway, free of all charges.

Further particulars and forms of tender to be obtained from Mr. Beynon, the Manager of the Company, Hollacombe, Paignton; and tenders to be sent to the undersigned, on or before the 31st inst.

The lowest tender not necessarily accepted; and the Directors reserve the right to accept part of any tender.

By order,
JOHN KITSON, Secretary.

Torquay, July 13, 1891.

COMMERCIAL GAS COMPANY.

THE Directors of the Commercial Gas Company are prepared to receive TENDERS for the surplus BREEZE produced at their several Works for the Twelve months ending July, 1892. The quantities are estimated to be as under, but the same cannot be guaranteed, and may be more or less:—

At the Stepney Works, in the Regent's Canal 5000 chaldrons of 48 bushels.
At the Wapping Works, in the Thames, 5000 chaldrons.
At the Poplar Works, in Bow Creek (free waterway), 5500 chaldrons.

The tenders may be for the whole or for one or more Works separately.

The Contractors must give security to remove the Breeze as it accumulates, to pay for the same monthly, and generally for the due fulfilment of the contract.

The form of agreement to be signed can be seen at the Company's Offices.

Tenders, sealed, and endorsed "Tender for Breeze," to be delivered here not later than the 30th inst.

The Directors reserve to themselves the right to accept any tender in part or in whole, and do not bind themselves to accept the highest or any tender.

Commercial Gas-Works, Stepney, E.,
July, 1891.

LEAFLETS for Distribution by Gas Companies and Corporation Gas Committees:—

OIL OR GAS FOR LIGHTING OUR HOMES? Price (delivered free) 5s. per 100; £2 per 1000. Larger quantities by agreement. Specimen copy, by post, 1½d.

THE COMPOSITION AND USE OF GAS LIME IN AGRICULTURE. By (the late) Dr. A. VOELCKER, Professor of Chemistry to the Royal Agricultural Society of England. Price 5s. per 100, post free.

THE VALUE OF SULPHATE OF AMMONIA AS A MANURE. By F. J. LLOYD, F.C.S., Consulting Chemist to the British Dairy Farmers Association, Lecturer on Agriculture at King's College, &c. Price 5s. per 100, post free.

THE USE OF SULPHATE OF AMMONIA AS A MANURE. By WILLIAM ARNOLD, Chairman of the Tamworth Gas Company. Price 2s. 6d. per 100, post free.

Published by WALTER KING, 11, Bolt Court, Fleet Street, LONDON, E.C.

NORTH OF IRELAND

ASSOCIATION of GAS MANAGERS

THE

ANNUAL MEETING

Of this Association

WILL BE HELD IN THE

TOWN HALL, BELFAST,

ON TUESDAY, AUG. 11, 1891.

The Chair to be taken at 11.30 a.m. by the President Mr. R. ROSS, of Dungannon.

The business will consist of the President's Address and three Papers; and arrangements will be made for a visit to the Belfast Gas-Works, to inspect the Claus Purification Plant.

The Members will dine together in the CASTLE RESTAURANT, QUEEN'S ARCADE, at Four p.m. Tickets, 4s. each, to be had from the Secretary. *It is important* that Dinner Tickets should be secured *not later than the 8th of August.*

The cordial co-operation of all Irish Gas Managers is earnestly requested by the Committee; and the Secretary will be glad to receive the names of any gentlemen intending to be present or to join the Association.

JAMES WHIMSTER,
Hon. Secretary.

Gas-Works, Armagh, July 24, 1891.

MR. W. H. BENNETT having had considerable experience in matters connected with Gas, Water, and Sanitary Improvement, begs to say that he continues to assist Inventors in the perfection of their designs, and to obtain for them PROVISIONAL PROTECTION, whereby their Inventions may be secured for Twelve months; or LETTERS PATENT, which are granted for Fourteen Years.

Patents completed, or proceeded with at any stage, thereby rendering it unnecessary for persons resident in the country to visit London.

Patents procured for Foreign Countries.

Information as to cost, &c., supplied gratuitously upon application to the Advertiser, 22, Great George Street, WESTMINSTER.

JAMES NEWTON & SONS,
(Established 1820)
FIRE-BRICK AND TILE MERCHANTS,
Wholesale and for Exportation,
FALCON DOCK, 78 AND 79, BANKSIDE,
SOUTHWARK, LONDON, S.E.
DEPÔT for STOURBRIDGE AND NEWCASTLE
FIRE-BRICKS, LUMPS, TILES and FIRE-CLAY
and every Article suitable for
GAS AND WATER WORKS.

PATENTS FOR INVENTIONS,

REGISTRATION OF TRADE MARKS and DESIGNS in all Countries.

SEARCHES made *re* novelty, and opinions given on all matters connected with above. *Full particulars on application to*

J. C. CHAPMAN,
Assoc.M.Inst.C.E., M.Inst.M.E., Fel. Inst. Patent Agents
70, CHANCERY LANE, LONDON, W.C.

Special experience in Gas and Ammonia Plant.

THOMAS ILLINGWORTH,

NORTH DEAN CHEMICAL WORKS,
Near HALIFAX,
MANUFACTURER OF SULPHURIC ACID
OF EXTRA QUALITY FOR MAKING
WHITE SULPHATE OF AMMONIA.

TAR, LIQUOR, AND SPENT OXIDE
Purchased for Cash against Delivery.

THOMAS LIGHTING Co.,

LTD.,
15, CARTHUSIAN ST.,
LONDON, E.C.

Manufacturers of the "Thomas" Patent Lamps for general lighting, also for Public Buildings, Institutions, &c., and for outside purposes.

The best Regenerative Lamp in the Market.

Special quotations to Gas Companies.

HEBBURN MAIN GAS COALS.

Produce of Gas per ton - - - - - - - 10,500 feet.
" Coke " - - - - - - - 13½ cwt.
Illuminating Power - - - - - - - 16 candles.

For Prices, f. o. b. Ship or delivered, apply to

W. RICHARDSON,

Hebburn Colliery Offices, NEWCASTLE-on-TYNE.

To effect a great saving in

GAS-FURNACES use our

Special Derbyshire GANNISTER BRICKS.

ADDRESS

JAMES WHITE & Co., Limited,

ALBERT WORKS, WIDNES.

NEWBATTLE CANNEL.

QUOTATIONS ON APPLICATION TO

THE LOTHIAN COAL COMPANY,

LIMITED,

NEWBATTLE COLLIERIES,

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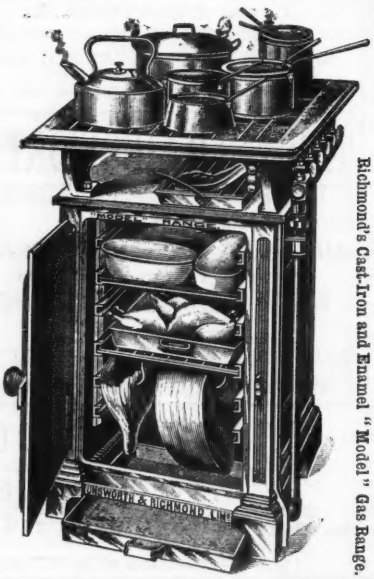

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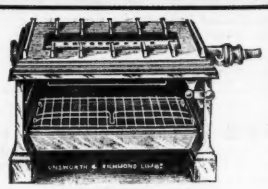

Quick Lever Grill.
No. 200 10×9×7½, 7/-. No. 205 12½×11×8, 10/-.

This "Model" Range has been signally successful! So large a demand having been created for it, we have now for the second time in Twelve months enlarged our Works to meet the press of orders.

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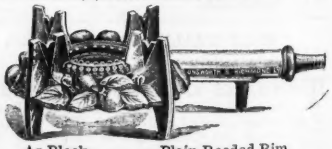
Burners suitable for heavy work.
No. 300 12ft., 2/6. No. 302 16ft., 3/6. No. 301 20ft., 4/6.



As Block. Plain Reeded Rim.
No. 306, 1/8 No. 313, 1/6 No. 315, 3/6
No. 308, 2/6 No. 314, 2/6

No.	Inside Dimensions of Oven.			Hot Plate.	Height over all.	Burners on Hot Plate.	For family of	Price unpacked.	Packed and Enamelled.
* 30	11in.	11in.	17in.	17½in. × 17½in.	28in.	2	2	£2 10 0	£3 0 0
* 40	12in.	12in.	20½in.	18½in. × 18½in.	28in.	3	4	3 0 0	3 10 0
* 50	12in.	12in.	25in.	18½in. × 18½in.	32in.	3	5	3 10 0	4 0 0
100	14in.	13½in.	28½in.	24in. × 22in.	36in.	4	6		5 15 0
120	16in.	16in.	28½in.	25½in. × 23½in.	36in.	5	10		7 0 0
140	18in.	18in.	28½in.	28in. × 26in.	36in.	6	15		9 0 0
160	22in.	21in.	32in.	31½in. × 30in.	41½in.	7	25 to 30		13 0 0

* These smaller sizes are not fitted with loose Burners at present.

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They are constructed with Air Vessels of great strength and capacity for storing a large quantity of air, which can be delivered at a pressure of 150 lbs. if necessary.

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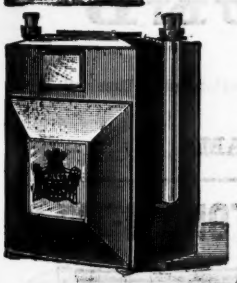

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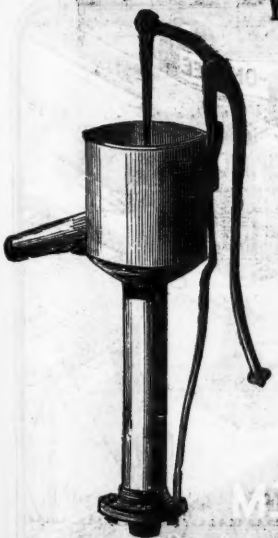

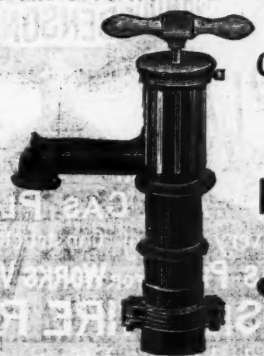

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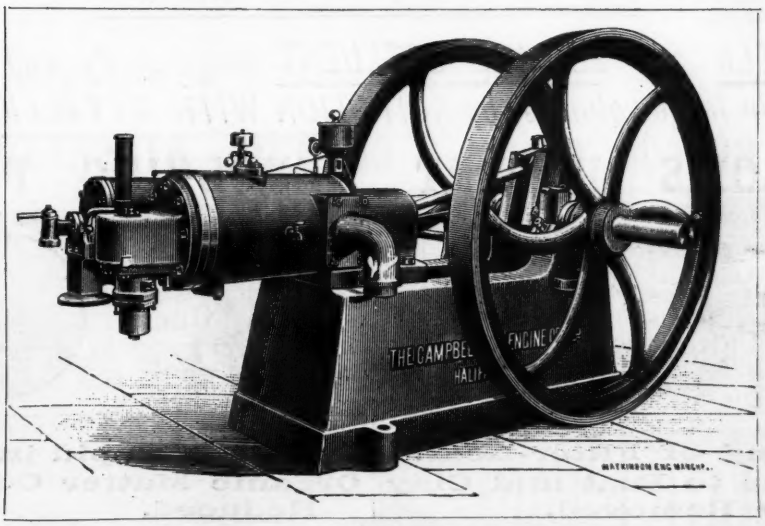

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Our Engines are used by Her Majesty's War Department; The South Metropolitan Gas Company, London, S.E.; at the Sydenham Gas-Works; Tiverton Gas-Works; Filey Gas-Works, &c.

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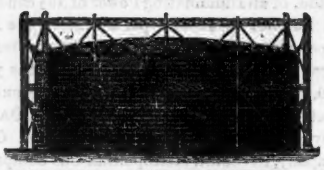

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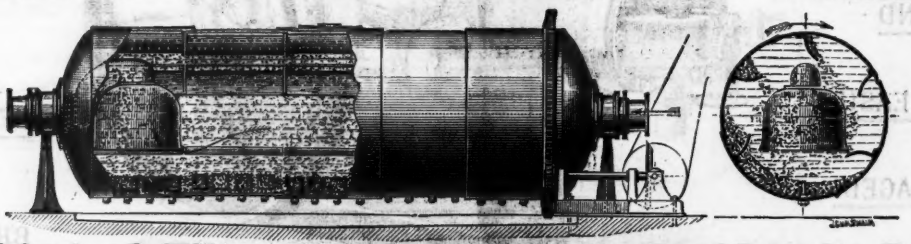

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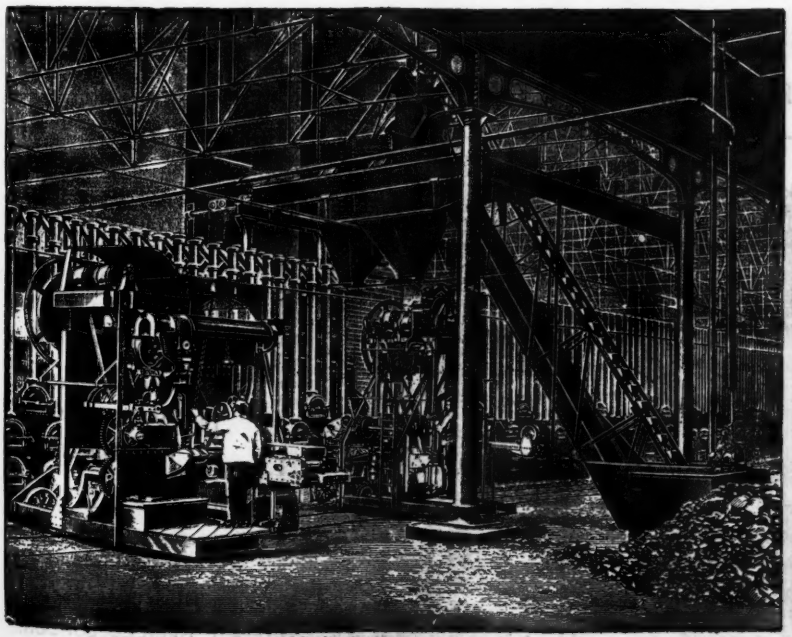

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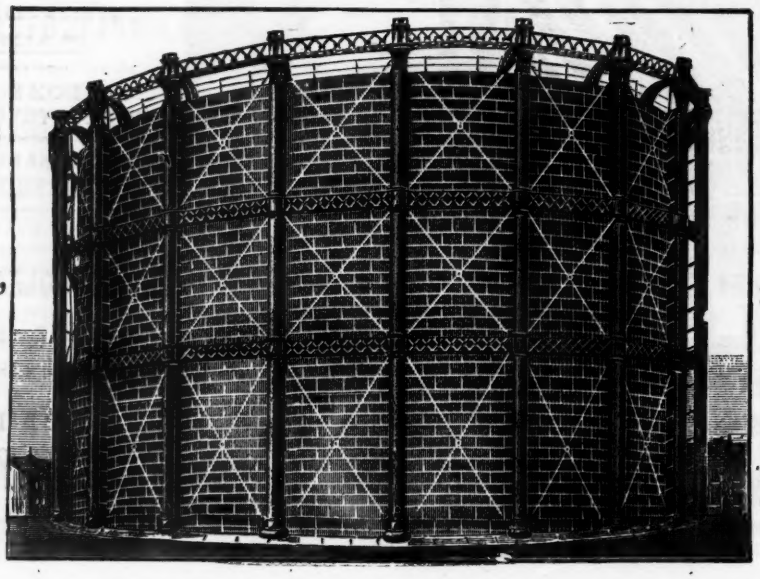

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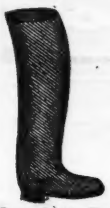

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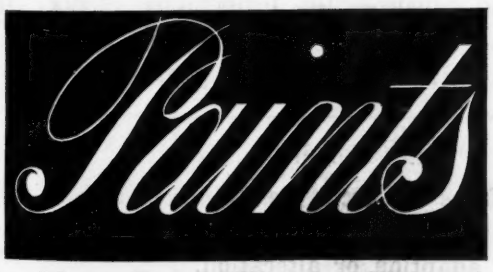

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